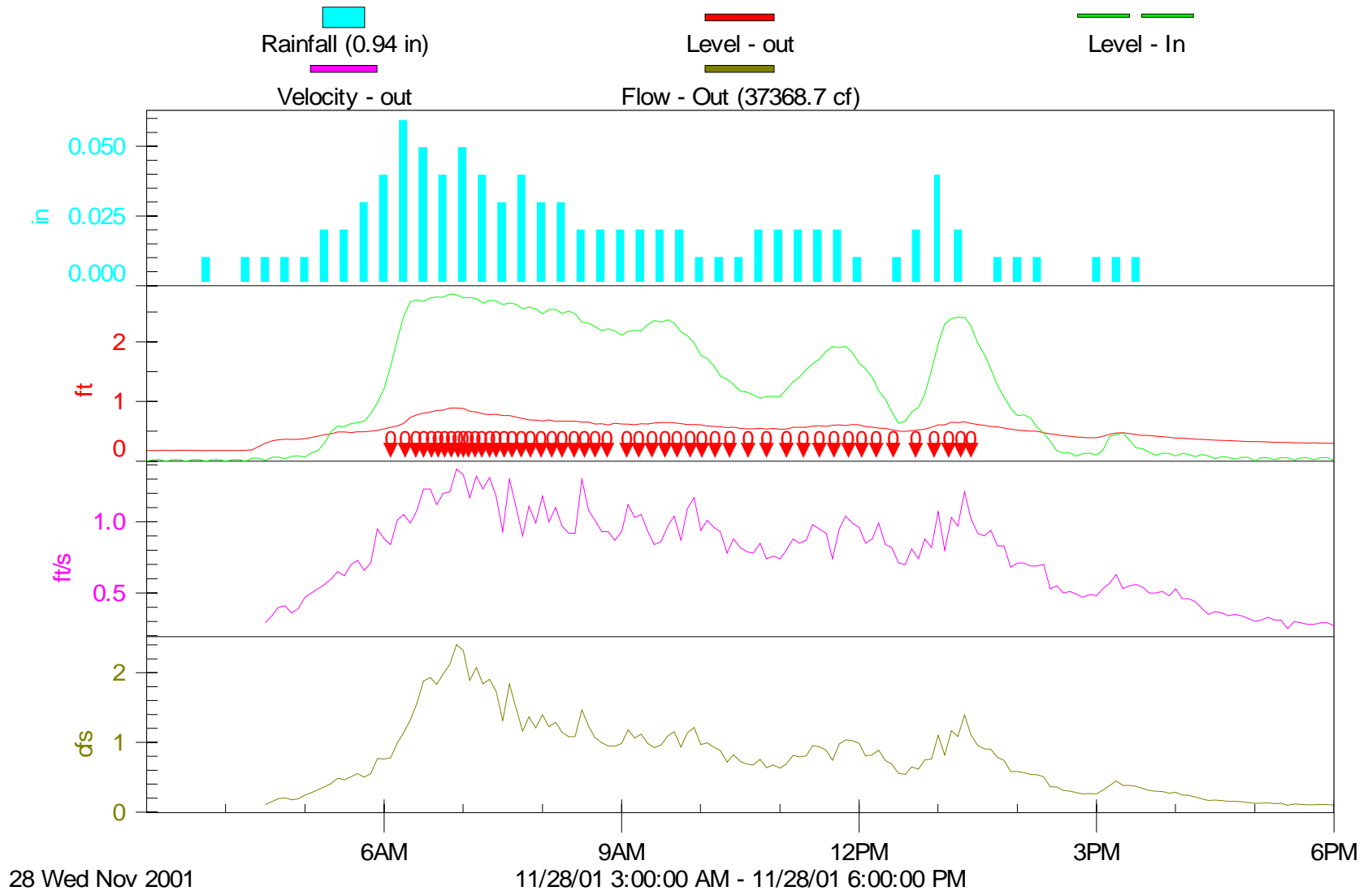


STORM EVENT

NUMBER 6

SR 405 Vortechincs

Storm #6, 28 November 2001



PROJECT NARRATIVE for B1K0556

Client: Taylor Associates
Project Manager: James Packman
Project Name: SR405 Vortechs
Project Number: Not Provided

1.0 DESCRIPTION OF CASE

Two water sample were received for the analysis of:

- Total Zinc by EPA 200.8
- Dissolved Zinc by EPA 200.8
- Hardness by SM2340B
- Orthophosphate by EPA 365.2
- Total Phosphorous by EPA 365.2
- Total Suspended Solids by EPA 160.2
- Turbidity
- pH by EPA 150.1

2.0 COMMENTS ON SAMPLE RECEIPT

The samples were received and logged in on 29th November 2001 at a temperature of 0.9 Degrees C.

Preparation and Analysis

There were no anomalies associated with the preparation and analysis with all QA being within method established criteria. However the following analyses do need to be commented on

Dissolved Zinc

The dissolved metals were filtered and preserved with Nitric Acid in house prior to analysis.

"I certify that this data package is in compliance with the Contract both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Director or his designee, as verified by the following signature."



Anna Grib
Project Manager
North Creek Analytical



Seattle 11720 North Creek Pkwy N, Suite 400, Bothell, WA 98011-8244
425.420.9200 fax 425.420.9210
Spokane East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
509.924.9200 fax 509.924.9290
Portland 9405 SW Nimbus Avenue, Beaverton, OR 97008-7132
503.906.9200 fax 503.906.9210
Bend 20332 Empire Avenue, Suite F-1, Bend, OR 97701-5711
541.383.9310 fax 541.382.7588

Taylor Associates
3917 Ashworth Ave North
Seattle WA/USA, 98103

Project: SR405 Vortechs
Project Number: Not Provided
Project Manager: James Packman

Reported:
12/11/01 10:37

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
VOR-112801-IN	BIK0556-01	Water	11/28/01 13:24	11/29/01 07:02
VOR-112801-OUT	BIK0556-02	Water	11/28/01 13:25	11/29/01 07:02

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Amar Gill, Project Manager

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Taylor Associates
 3917 Ashworth Ave North
 Seattle WA/USA, 98103

Project: SR405 Vortechs
 Project Number: Not Provided
 Project Manager: James Packman

Reported:
 12/11/01 10:37

Total Metals by EPA 200 Series Methods
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
OR-112801-IN (B1K0556-01) Water Sampled: 11/28/01 13:24 Received: 11/29/01 07:02									
Zinc	0.0153	0.0100	mg/l	1	1L04009	12/04/01	12/05/01	EPA 200.8	
OR-112801-OUT (B1K0556-02) Water Sampled: 11/28/01 13:25 Received: 11/29/01 07:02									
Zinc	0.0425	0.0100	mg/l	1	1L04009	12/04/01	12/05/01	EPA 200.8	

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Page 2 of 10

Taylor Associates
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Seattle WA/USA, 98103

Project: SR405 Vortechs
Project Number: Not Provided
Project Manager: James Packman

Reported:
12/11/01 10:37

Dissolved Metals by EPA 200 Series Methods
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
VOR-112801-IN (B1K0556-01) Water Sampled: 11/28/01 13:24 Received: 11/29/01 07:02									
Zinc	0.0117	0.0100	mg/l	1	1L06009	12/06/01	12/06/01	EPA 200.8	
VOR-112801-OUT (B1K0556-02) Water Sampled: 11/28/01 13:25 Received: 11/29/01 07:02									
Zinc	0.0383	0.0100	mg/l	1	1L06009	12/06/01	12/06/01	EPA 200.8	

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Amar Gill, Project Manager

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Page 3 of 10

Taylor Associates
 3917 Ashworth Ave North
 Seattle WA/USA, 98103

Project: SR405 Vortechs
 Project Number: Not Provided
 Project Manager: James Packman

Reported:
 12/11/01 10:37

Conventional Chemistry Parameters by APHA/EPA Methods
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
VOR-112801-IN (B1K0556-01) Water Sampled: 11/28/01 13:24 Received: 11/29/01 07:02									
Hardness	17.0	1.00	mg eq. CaCO ₃ /L	1	1L04009	12/04/01	12/08/01	SM 2340B	
Orthophosphate-phosphorus	0.0120	0.00200	mg/l	"	1L05004	11/29/01	11/29/01	EPA 365.2	
Phosphorus	0.0404	0.00500	"	"	1L03029	12/03/01	12/03/01	"	
pH	6.92		pH Units	"	1L01005	11/29/01	11/29/01	EPA 150.1	
Total Suspended Solids	30	4.0	mg/l	"	1L11001	12/04/01	12/10/01	EPA 160.2	
Turbidity	23.7	1.00	NTU	"	1L03016	11/30/01	11/30/01	EPA 180.1	
VOR-112801-OUT (B1K0556-02) Water Sampled: 11/28/01 13:25 Received: 11/29/01 07:02									
Hardness	16.7	1.00	mg eq. CaCO ₃ /L	1	1L04009	12/04/01	12/08/01	SM 2340B	
Orthophosphate-phosphorus	0.0110	0.00200	mg/l	"	1L05004	11/29/01	11/29/01	EPA 365.2	
Phosphorus	0.0450	0.00500	"	"	1L03029	12/03/01	12/03/01	"	
pH	7.00		pH Units	"	1L01005	11/29/01	11/29/01	EPA 150.1	
Total Suspended Solids	24	4.0	mg/l	"	1L11001	12/04/01	12/10/01	EPA 160.2	
Turbidity	17.4	1.00	NTU	"	1L03016	11/30/01	11/30/01	EPA 180.1	

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Taylor Associates
3917 Ashworth Ave North
Seattle WA/USA, 98103

Project: SR405 Vortechs
Project Number: Not Provided
Project Manager: James Packman

Reported:
12/11/01 10:37

Total Metals by EPA 200 Series Methods - Quality Control
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1L04009: Prepared 12/04/01 Using EPA 200 Series										
Blank (1L04009-BLK1)										
Zinc	ND	0.0100	mg/l							
LCS (1L04009-BS1)										
Zinc	0.208	0.0100	mg/l	0.200		104	85-115			
LCS Dup (1L04009-BSD1)										
Zinc	0.209	0.0100	mg/l	0.200		104	85-115	0.480	15	
Duplicate (1L04009-DUP1)										
					Source: B1K0488-01					
Zinc	ND	0.0100	mg/l		ND			3.99	20	
Matrix Spike (1L04009-MS1)										
					Source: B1K0488-01					
Zinc	0.212	0.0100	mg/l	0.200	ND	101	75-125			
Matrix Spike (1L04009-MS2)										
					Source: B1K0580-01					
Zinc	0.203	0.0100	mg/l	0.200	ND	100	75-125			

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Taylor Associates
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Project: SR405 Vortechs
 Project Number: Not Provided
 Project Manager: James Packman

Reported:
 12/11/01 10:37

Dissolved Metals by EPA 200 Series Methods - Quality Control
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC Limits	RPD	RPD Limit	Notes
Batch 1L06009: Prepared 12/06/01 Using EPA 3005A									
Blank (1L06009-BLK1)									
inc	ND	0.0100	mg/l						
LCS (1L06009-BS1)									
Zinc	0.194	0.0100	mg/l	0.200		97.0	85-115		
LCS Dup (1L06009-BSD1)									
Zinc	0.193	0.0100	mg/l	0.200		96.5	85-115	0.517	15
Matrix Spike (1L06009-MS1)									
					Source: B1K0572-01				
Zinc	0.199	0.0100	mg/l	0.200	ND	99.5	75-125		
Matrix Spike Dup (1L06009-MSD1)									
					Source: B1K0572-01				
inc	0.200	0.0100	mg/l	0.200	ND	100	75-125	0.501	20

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Taylor Associates
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Project: SR405 Vortechs
 Project Number: Not Provided
 Project Manager: James Packman

Reported:
 12/11/01 10:37

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1L01005: Prepared 11/29/01 Using General Preparation

Duplicate (1L01005-DUP1)

Source: B1K0556-01

pH	7.03		pH Units		6.92			1.58	10	
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Batch 1L03016: Prepared 11/30/01 Using General Preparation

Blank (1L03016-BLK1)

Turbidity	ND	1.00	NTU							
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LCS (1L03016-BS1)

Turbidity	19.3	1.00	NTU	20.0		96.5	90-110			
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LCS Dup (1L03016-BSD1)

Turbidity	19.3	1.00	NTU	20.0		96.5	90-110	0.00	20	
-----------	------	------	-----	------	--	------	--------	------	----	--

Duplicate (1L03016-DUP1)

Source: B1K0556-01

idity	23.2	1.00	NTU		23.7			2.13	20	
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Batch 1L03029: Prepared 12/03/01 Using General Preparation

Blank (1L03029-BLK1)

Phosphorus	ND	0.00500	mg/l							
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LCS (1L03029-BS1)

Phosphorus	0.144	0.00500	mg/l	0.150		96.0	90-120			
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LCS Dup (1L03029-BSD1)

Phosphorus	0.144	0.00500	mg/l	0.150		96.0	90-120	0.00	20	
------------	-------	---------	------	-------	--	------	--------	------	----	--

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Taylor Associates
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Project: SR405 Vortechs
 Project Number: Not Provided
 Project Manager: James Packman

Reported:
 12/11/01 10:37

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1L03029: Prepared 12/03/01 Using General Preparation										
Matrix Spike (1L03029-MS1)					Source: B1K0522-03					
phosphorus	0.130	0.00500	mg/l	0.121	0.0119	97.6	60-139			
Matrix Spike Dup (1L03029-MSD1)					Source: B1K0522-03					
phosphorus	0.130	0.00500	mg/l	0.121	0.0119	97.6	60-139	0.00	25	
Batch 1L04009: Prepared 12/04/01 Using EPA 200 Series										
Blank (1L04009-BLK1)										
hardness	ND	1.00mg eq. CaCO3/L								
LCS (1L04009-BS1)										
hardness	33.6	1.00mg eq. CaCO3/L	33.1			102	70-130			
LCS Dup (1L04009-BSD1)										
ness	33.5	1.00mg eq. CaCO3/L	33.1			101	70-130	0.298	20	
Duplicate (1L04009-DUP1)					Source: B1K0488-01					
Hardness	70.7	1.00mg eq. CaCO3/L			75.0			5.90	20	
Matrix Spike (1L04009-MS1)					Source: B1K0488-01					
hardness	101	1.00mg eq. CaCO3/L	33.1		75.0	78.5	75-125			
Batch 1L05004: Prepared 11/29/01 Using General Preparation										
Blank (1L05004-BLK1)										
Orthophosphate-phosphorus	ND	0.00200	mg/l							

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 Environmental Laboratory Network

Page 8 of 10

Taylor Associates
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Seattle WA/USA, 98103

Project: SR405 Vortechs
Project Number: Not Provided
Project Manager: James Packman

Reported:
12/11/01 10:37

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
---------	--------	--------------------	-------	----------------	------------------	------	----------------	-----	--------------	-------

Batch 1L05004: Prepared 11/29/01 Using General Preparation

LCS (1L05004-BS1)

Orthophosphate-phosphorus	0.150	0.00200	mg/l	0.150		100	90-110			
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LCS Dup (1L05004-BSD1)

Orthophosphate-phosphorus	0.155	0.00200	mg/l	0.150		103	90-110	3.28	20	
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Matrix Spike (1L05004-MS1)

Source: B1K0556-01

Orthophosphate-phosphorus	0.0620	0.00200	mg/l	0.0499	0.0120	100	80-120			
---------------------------	--------	---------	------	--------	--------	-----	--------	--	--	--

Matrix Spike Dup (1L05004-MSD1)

Source: B1K0556-01

Orthophosphate-phosphorus	0.0659	0.00200	mg/l	0.0499	0.0120	108	80-120	6.10	25	
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Batch 1L11001: Prepared 12/04/01 Using General Preparation

Blank (1L11001-BLK1)

1 Suspended Solids	ND	4.0	mg/l							
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Duplicate (1L11001-DUP1)

Source: B1K0556-01

Total Suspended Solids	30	4.0	mg/l		30			0.0	19	
------------------------	----	-----	------	--	----	--	--	-----	----	--

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Taylor Associates
3917 Ashworth Ave North
Seattle WA/USA, 98103

Project: SR405 Vortechs
Project Number: Not Provided
Project Manager: James Packman

Reported:
12/11/01 10:37

Notes and Definitions

DET Analyte DETECTED
ND Analyte NOT DETECTED at or above the reporting limit
NR Not Reported
dry Sample results reported on a dry weight basis
RPD Relative Percent Difference

North Creek Analytical - Bothell



Amar Gill, Project Manager

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B1K0556

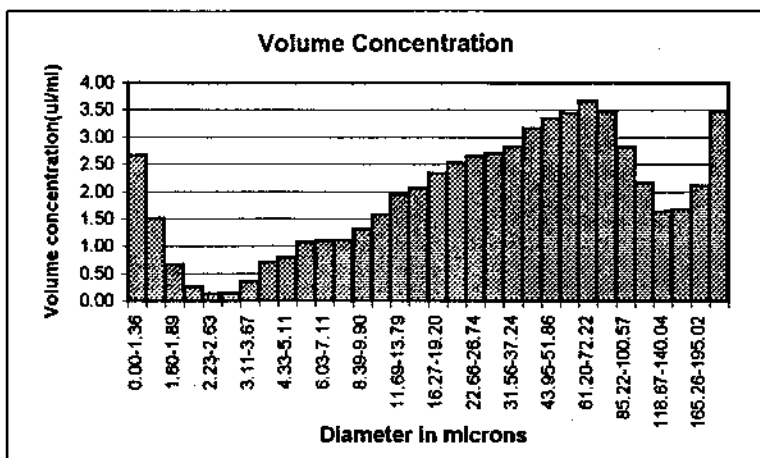
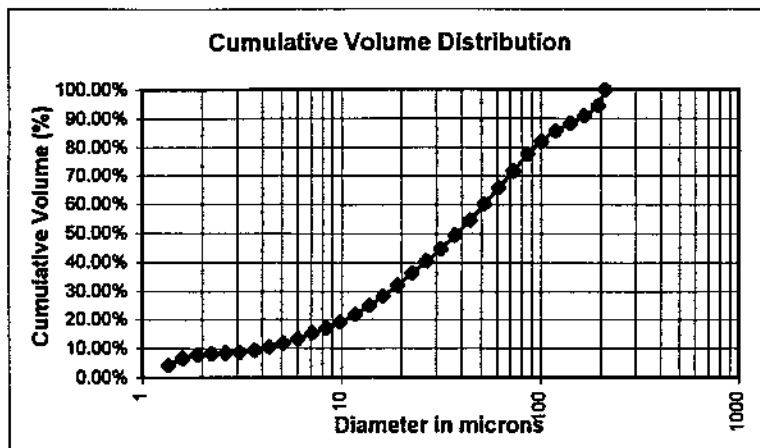
Appendix B- field sheets.xls, CoC - SR405

Particle Size Distribution Analysis Results: Storm 6 Inlet

Report Prepared for:
Ingrid Weltz
Taylor Associates
Tel: 206.633.4486

Analysis Performed by:
Lynel Rabago
University of Washington
Department of Civil Engineering
Contact: Dr. David Stensel
Tel: 206.543.9358

Project ID: SR405 Vortechinics
Sample ID: VOR-112801-IN
Date and Time Collected: 11/28/01 0.558333333
Date and Time of PSD Analysis: 11/30/01 0.505555556



Size Range (microns)	Volume Concentration (µl/l)	Cumulative Volume (%)	Mass (mg)
0.00-1.36	2.65	4.32%	1.12
1.36-1.60	1.51	6.78%	0.63
1.60-1.89	0.68	7.88%	0.28
1.89-2.23	0.26	8.31%	0.11
2.23-2.63	0.12	8.51%	0.05
2.63-3.11	0.14	8.73%	0.06
3.11-3.67	0.35	9.31%	0.15
3.67-4.33	0.71	10.47%	0.30
4.33-5.11	0.79	11.75%	0.33
5.11-6.03	1.07	13.50%	0.45
6.03-7.11	1.10	15.29%	0.46
7.11-8.39	1.11	17.10%	0.47
8.39-9.90	1.31	19.23%	0.55
9.90-11.69	1.58	21.81%	0.66
11.69-13.79	1.95	24.98%	0.82
13.79-16.27	2.07	28.35%	0.87
16.27-19.20	2.34	32.16%	0.98
19.20-22.66	2.53	36.28%	1.06
22.66-26.74	2.64	40.58%	1.11
26.74-31.56	2.69	44.96%	1.13
31.56-37.24	2.82	49.55%	1.19
37.24-43.95	3.16	54.70%	1.33
43.95-51.86	3.35	60.16%	1.41
51.86-61.20	3.45	65.77%	1.45
61.20-72.22	3.66	71.74%	1.54
72.22-85.22	3.47	77.40%	1.46
85.22-100.57	2.82	81.99%	1.19
100.57-118.67	2.16	85.50%	0.91
118.67-140.04	1.65	88.18%	0.69
140.04-165.26	1.67	90.91%	0.70
165.26-195.02	2.11	94.35%	0.89
195.02-212	3.47	100.00%	1.46
Total	61.39		25.80

Computed Statistics:

Weight Mean = 62.49 microns
D₁₀ = 3.67 microns
D₅₀ = 37.24 microns
D₉₀ = 140.04 microns

Volume of Sample: 950 ml
Volume of Dilution: 0 ml added
Comments: 1/0/00

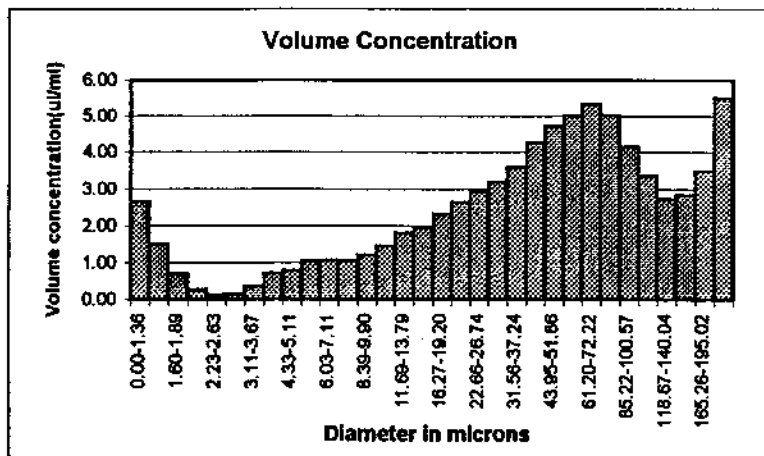
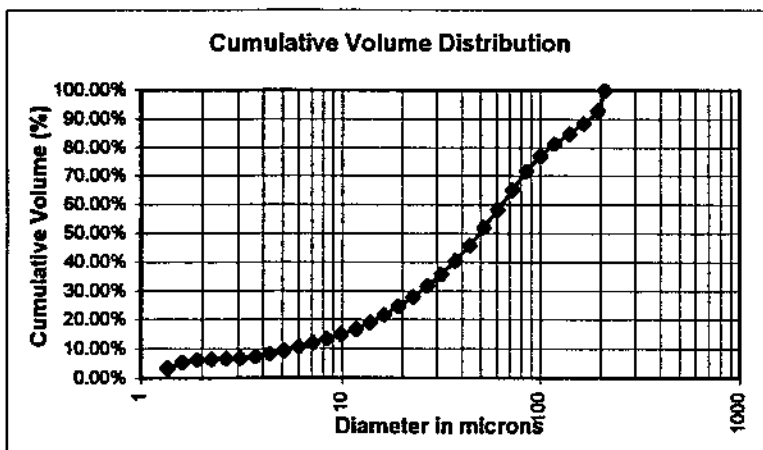
Size Range (microns)	Mass of TSS (mg)	% Mass TSS
< 212	25.80	89.90%
212-425	1.70	5.92%
425-850	0.40	1.39%
>850	0.80	2.79%
Total	28.70	100.00%

Particle Size Distribution Analysis Results: Storm 6 Outlet

Report Prepared for:
Ingrid Weltz
Taylor Associates
Tel: 206.633.4486

Analysis Performed by:
Lynel Rabago
University of Washington
Department of Civil Engineering
Contact: Dr. David Stensel
Tel: 206.543.9358

Project ID: SR405 Vortechinics
Sample ID: VOR-112801-OUT
Date and Time Collected: 11/28/01 0.559027778
Date and Time of PSD Analysis: 11/30/01 0.5375



Size Range (microns)	Volume Concentration (ul/l)	Cumulative Volume (%)	Mass (mg)
0.00-1.36	2.65	3.41%	0.99
1.36-1.60	1.51	5.35%	0.56
1.60-1.89	0.68	6.23%	0.25
1.89-2.23	0.26	6.57%	0.10
2.23-2.63	0.13	6.73%	0.05
2.63-3.11	0.14	6.91%	0.05
3.11-3.67	0.36	7.37%	0.13
3.67-4.33	0.71	8.28%	0.26
4.33-5.11	0.78	9.29%	0.29
5.11-6.03	1.05	10.63%	0.39
6.03-7.11	1.05	11.99%	0.39
7.11-8.39	1.04	13.32%	0.39
8.39-9.90	1.20	14.87%	0.45
9.90-11.69	1.45	16.73%	0.54
11.69-13.79	1.80	19.04%	0.67
13.79-16.27	1.97	21.57%	0.73
16.27-19.20	2.32	24.55%	0.86
19.20-22.66	2.63	27.93%	0.98
22.66-26.74	2.92	31.69%	1.09
26.74-31.56	3.19	35.78%	1.18
31.56-37.24	3.59	40.40%	1.33
37.24-43.95	4.25	45.86%	1.58
43.95-51.86	4.72	51.92%	1.75
51.86-61.20	5.00	58.35%	1.86
61.20-72.22	5.33	65.21%	1.98
72.22-85.22	5.02	71.66%	1.87
85.22-100.57	4.14	76.99%	1.54
100.57-118.67	3.36	81.30%	1.25
118.67-140.04	2.72	84.80%	1.01
140.04-165.26	2.84	88.45%	1.05
165.26-195.02	3.49	92.93%	1.30
195.02-212	5.50	100.00%	2.04
Total	77.77		28.90

Computed Statistics:

Weight Mean = 73.31 microns
D₁₀ = 5.11 microns
D₅₀ = 43.95 microns
D₉₀ = 165.26 microns

Volume of Sample: 900 ml
Volume of Dilution: 0 ml added
Comments: 1/0/00

Size Range (microns)	Mass of TSS (mg)	% Mass TSS
< 212	28.90	93.23%
212-425	0.80	2.58%
425-850	0.60	1.94%
> 850	0.70	2.26%
Total	31.00	100.00%

SITE VISIT SHEET (SR 405 Vortechs™ Monitoring)

Date/Time 11/26/01 12:45 Field Staff JP Weather cloudy & cool

Pre-Storm Visit or - Post-Storm Visit (circle one)

INLET

Check Current Readings / Download: 11/26
 ISCO Time? reset (Y/N)? 13:19 N
 Time downloaded —
 level 0.043
and 0.026
(back in for h)

OUTLET

Check Current Readings / Download: 11/26
 ISCO Time? reset (Y/N)? 13:15 N
 Level (ft.) 0.178 ft
 Velocity (f/s) 0.13
 Flow (cfs) 0.8
 Total Flow (cf) 108391.8
 Sig/Spec str. 0/0
 Time downloaded —

Pre - Storm Visit

INLET

Battery (V) 12.4
 Clean bottle (Y/N)? Y
 Pump tubing ok (Y/N)? Replaced? Y
 Sampler tubing ok (Y/N)? Y
 Strainer ok? —
 Ext. desiccant ok (Y/N)? Changed? N, Y
 Int. desiccant ok (Y/N)? Changed? Y
 Measure Dn level? Ok? —
 Sample Volume (ml) —
 Inspect Rain Gage Y
 Sampler enabled? (Y/N) Y at 14:17

OUTLET

Battery (V) 12.6
 Clean bottle (Y/N)? Y
 Pump tubing ok (Y/N)? Replaced? Y, N
 Sampler tubing ok (Y/N)? Y
 Strainer ok? —
 Ext. desiccant ok (Y/N)? Changed? —
 Int. desiccant ok (Y/N)? Changed? Y
 Measure Dn level? Ok? —
 Enable level (ft) > 0.55
 Pacing (cf) / Sample Volume (ml) 600 cf / 200 ml
 Sampler enabled? (Y/N) ✓ at 14:14
Delay to start Tues 12:00 11/27

Post - Storm Visit

INLET

Equipment Ran Completely? —
 Sampler Enabled (date/time)? —
 Composite Began (date/time)? —
 Number of subsamples taken? —
 Any subsample collection errors? —
 Last Sample (date/time)? —
 Est. Sample Volume Collected (ml) —
 Sample ID? —

OUTLET

Equipment Ran Completely? —
 Sampler Enabled (date/time)? —
 Composite Began (date/time)? —
 Number of subsamples taken? —
 Any subsample collection errors? —
 Last Sample (date/time)? —
 Est. Sample Volume Collected (ml) —
 Sample ID? —

Y/N	Value	Storm Validation Criteria
	hrs. (if known)	Was there an antecedent dry period of at least six hours?
	in.	Was total rainfall greater than or equal to 0.25"?
	hrs.	Was runoff duration greater than one hour?

Y/N	Value	Flow-weighted Composite Sample Validation Criteria
	% (approx.)	Was greater than 75% of the total volume of the storm sampled?
	# subsample	Were at least 10 sub-samples collected at the inlet?
	# subsample	Were at least 10 sub-samples collected at the outlet?

Was a field duplicate collected? If so, Sample ID. _____ Field blank collected? If so, Sample ID. _____

NOTES (including any problems with equipment or maintenance activities performed):

SITE VISIT SHEET (SR 405 Vortechs™ Monitoring)

Date/Time 11/28/01 19:30 Field Staff JP Weather Rainy

Pre-Storm Visit - or Post-Storm Visit (circle one)

INLET

Check Current Readings / Download:

ISCO Time? reset (Y/N)? 19:30, N
 Time downloaded 19:50
level 0.016

OUTLET

Check Current Readings / Download:

ISCO Time? reset (Y/N)? 19:30, N
 Level (ft.) 0.232
 Velocity (f/s) 0.34
 Flow (cfs) 0.145
 Total Flow (cf) 37231.7
 Sig/Spec str. 270/7670
 Time downloaded 19:45

INLET

Battery (V) _____
 Clean bottle (Y/N)? _____
 Pump tubing ok (Y/N)? Replaced? _____
 Sampler tubing ok (Y/N)? _____
 Strainer ok? _____
 Ext. desiccant ok (Y/N)? Changed? _____
 Int. desiccant ok (Y/N)? Changed? _____
 Measure Dn level? Ok? _____
 Sample Volume (ml) _____
 Inspect Rain Gage _____
 Sampler enabled? (Y/N) _____

Pre - Storm Visit

OUTLET

Battery (V) _____
 Clean bottle (Y/N)? _____
 Pump tubing ok (Y/N)? Replaced? _____
 Sampler tubing ok (Y/N)? _____
 Strainer ok? _____
 Ext. desiccant ok (Y/N)? Changed? _____
 Int. desiccant ok (Y/N)? Changed? _____
 Measure Dn level? Ok? _____
 Enable level (ft) _____
 Pacing (cf) / Sample Volume (ml) _____
 Sampler enabled? (Y/N) _____

Post - Storm Visit

INLET

Equipment Ran Completely? Y
 Sampler Enabled (date/time)? 6:03 11/28
 Composite Began (date/time)? 11
 Number of subsamples taken? 50
 Any subsample collection errors? N
 Last Sample (date/time)? 13:24 11/28
 Est. Sample Volume Collected (ml) 4L
 Sample ID? VOR-112801-IN

OUTLET

Equipment Ran Completely? Y
 Sampler Enabled (date/time)? 6:03 11/28
 Composite Began (date/time)? 11
 Number of subsamples taken? 50
 Any subsample collection errors? N
 Last Sample (date/time)? 13:25 11/28
 Est. Sample Volume Collected (ml) 10L
 Sample ID? VOR-112801-OUT

Y/N	Value	Storm Validation Criteria
<u>Y</u>	hrs. (if known)	Was there an antecedent dry period of at least six hours?
<u>Y</u>	<u>0.94</u> in.	Was total rainfall greater than or equal to 0.25"?
<u>Y</u>	<u>~12</u> hrs.	Was runoff duration greater than one hour?

Y/N	Value	Flow-weighted Composite Sample Validation Criteria
<u>Y</u>	<u>~85</u> % (approx.)	Was greater than 75% of the total volume of the storm sampled?
<u>Y</u>	<u>50</u> # subsample	Were at least 10 sub-samples collected at the inlet?
<u>Y</u>	<u>50</u> # subsample	Were at least 10 sub-samples collected at the outlet?

Was a field duplicate collected? If so, Sample ID. _____ Field blank collected? If so, Sample ID. _____

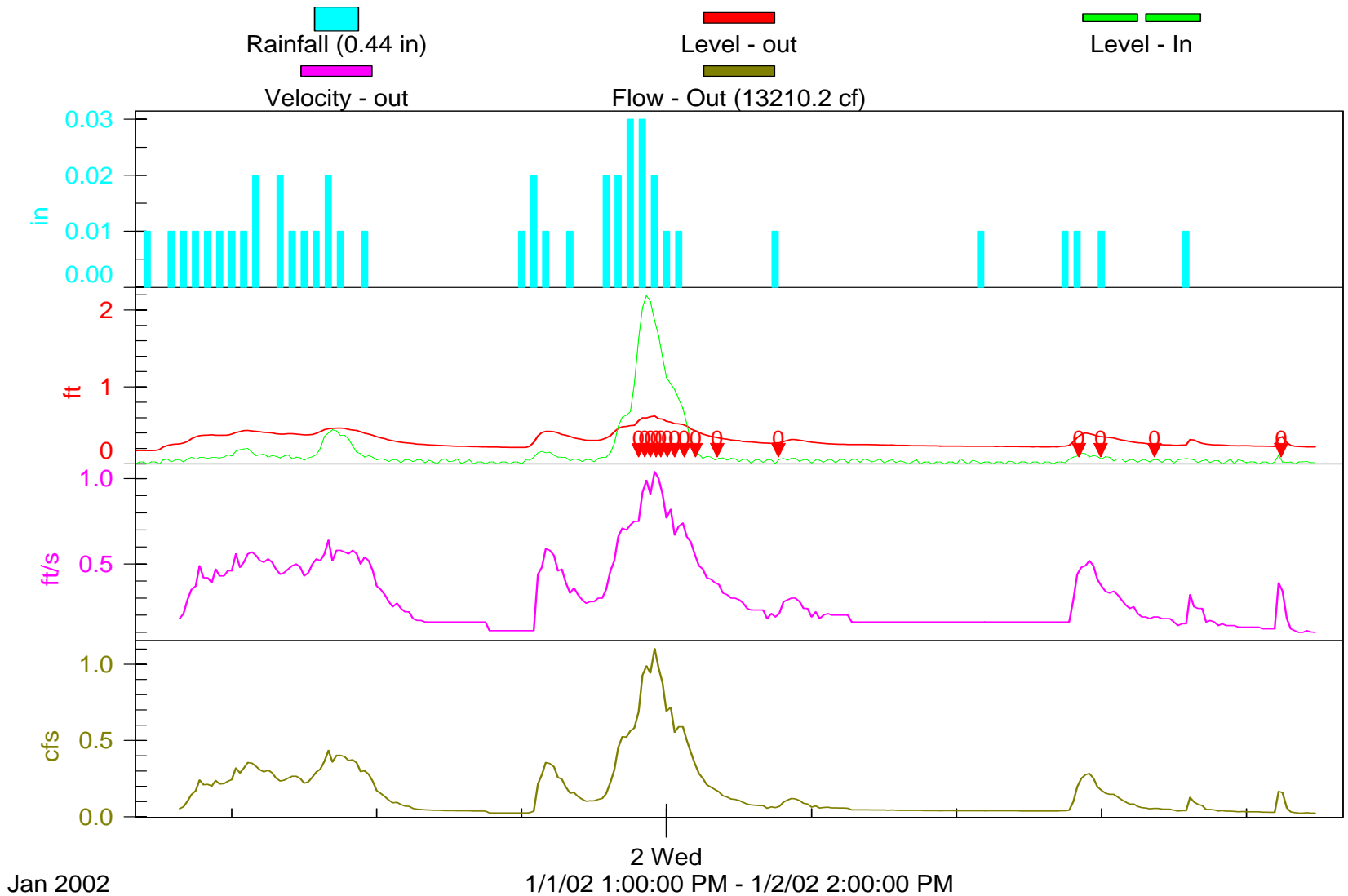
NOTES (including any problems with equipment or maintenance activities performed):

STORM EVENT

NUMBER 7

SR 405 Vortechincs

Storm #7, 1-2 January 2002



PROJECT NARRATIVE for B2A0016

Client: Taylor Associates
Project Manager: James Packman
Project Name: SR405 Vortechs
Project Number: Not Provided

1.0 DESCRIPTION OF CASE

Two (2) water sample were received for the analysis of:

- Total Zinc by EPA 200.8
- Dissolved Zinc by EPA 200.8
- Hardness by SM2340B
- Orthophosphate by EPA 365.2
- Total Phosphorous by EPA 365.2
- Total Suspended Solids by EPA 160.2
- Turbidity
- pH by EPA 150.1

2.0 COMMENTS ON SAMPLE RECEIPT

The samples were received and logged in on 2nd January 2002 at a temperature of 5.8 Degrees C.

Preparation and Analysis

There were no anomalies associated with the preparation and analysis with all QA being within method established criteria. However the following analyses do need to be commented on

Dissolved Zinc

The dissolved metals were filtered and preserved with Nitric Acid in house prior to analysis.

"I certify that this data package is in compliance with the Contract both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Director or his designee, as verified by the following signature."



Amar Gill
Project Manager
North Creek Analytical



Seattle 11720 North Creek Pkwy N, Suite 400, Bothell, WA 98011-8244
425.420.9200 fax 425.420.9210
Spokane East 11115 Montgomery, Suite 8, Spokane, WA 99206-4776
509.924.9200 fax 509.924.9290
Portland 9405 SW Nimbus Avenue, Beaverton, OR 97008-7132
503.906.9200 fax 503.906.9210
Bend 20332 Empire Avenue, Suite F-1, Bend, OR 97701-5711
541.383.9310 fax 541.382.7588

Taylor Associates Inc
7104 Greenwood Ave N
Seattle WA/USA, 98103

Project: SR405 Vortechs
Project Number: Not Provided
Project Manager: James Packman

Reported:
01/15/02 17:15

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
VDR-010202-IN	B2A0016-01	Water	01/02/02 12:43	01/02/02 15:30
VDR-010202-OUT	B2A0016-02	Water	01/02/02 12:45	01/02/02 15:30

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Environmental Laboratory Network

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 Seattle WA/USA, 98103

Project: SR405 Vortechs
 Project Number: Not Provided
 Project Manager: James Packman

Reported:
 01/15/02 17:15

Total Metals by EPA 200 Series Methods
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
/DR-010202-IN (B2A0016-01) Water Sampled: 01/02/02 12:43 Received: 01/02/02 15:30									
Zinc	0.141	0.0100	mg/l	1	2A07011	01/04/02	01/05/02	EPA 200.8	
/DR-010202-OUT (B2A0016-02) Water Sampled: 01/02/02 12:45 Received: 01/02/02 15:30									
Zinc	0.118	0.0100	mg/l	1	2A07011	01/04/02	01/05/02	EPA 200.8	

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Project: SR405 Vortechs
Project Number: Not Provided
Project Manager: James Packman

Reported:
01/15/02 17:15

Dissolved Metals by EPA 200 Series Methods
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
VDR-010202-IN (B2A0016-01) Water Sampled: 01/02/02 12:43 Received: 01/02/02 15:30									
Zinc	0.0285	0.0100	mg/l	1	2A10022	01/10/02	01/10/02	EPA 200.8	
VDR-010202-OUT (B2A0016-02) Water Sampled: 01/02/02 12:45 Received: 01/02/02 15:30									
Zinc	0.0228	0.0100	mg/l	1	2A10022	01/10/02	01/10/02	EPA 200.8	

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Project: SR405 Vortechs
 Project Number: Not Provided
 Project Manager: James Packman

Reported:
 01/15/02 17:15

Conventional Chemistry Parameters by APHA/EPA Methods North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
DR-010202-IN (B2A0016-01) Water Sampled: 01/02/02 12:43 Received: 01/02/02 15:30									
Hardness	38.6	1.00	mg eq. CaCO ₃ /L	1	2A08015	01/08/02	01/11/02	SM 2340B	
Orthophosphate-phosphorus	0.00339	0.00200	mg/l	"	2A05002	01/04/02	01/04/02	EPA 365.2	
Phosphorus	0.461	0.0100	"	2	2A15024	01/14/02	01/15/02	"	
pH	7.27		pH Units	1	2A02044	01/02/02	01/02/02	EPA 150.1	
Total Suspended Solids	230	4.0	mg/l	"	2A08002	01/03/02	01/07/02	EPA 160.2	
Turbidity	49.3	1.00	NTU	"	2A02046	01/02/02	01/02/02	EPA 180.1	
VDR-010202-OUT (B2A0016-02) Water Sampled: 01/02/02 12:45 Received: 01/02/02 15:30									
Hardness	36.8	1.00	mg eq. CaCO ₃ /L	1	2A08015	01/08/02	01/11/02	SM 2340B	
Orthophosphate-phosphorus	ND	0.00200	mg/l	"	2A05002	01/04/02	01/04/02	EPA 365.2	
Phosphorus	0.268	0.00500	"	"	2A10001	01/08/02	01/08/02	"	
pH	7.16		pH Units	"	2A02044	01/02/02	01/02/02	EPA 150.1	
Total Suspended Solids	140	4.0	mg/l	"	2A08002	01/03/02	01/07/02	EPA 160.2	
Turbidity	42.9	1.00	NTU	"	2A02046	01/02/02	01/02/02	EPA 180.1	

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Project: SR405 Vortechs
 Project Number: Not Provided
 Project Manager: James Packman

Reported:
 01/15/02 17:15

Total Metals by EPA 200 Series Methods - Quality Control
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2A07011: Prepared 01/04/02 Using EPA 200 Series										
Blank (2A07011-BLK1)										
Zinc	ND	0.0100	mg/l							
LCS (2A07011-BS1)										
Zinc	0.210	0.0100	mg/l	0.200		105	85-115			
LCS Dup (2A07011-BSD1)										
Zinc	0.207	0.0100	mg/l	0.200		104	85-115	1.44	15	
Duplicate (2A07011-DUP1)										
					Source: B2A0040-01					
Zinc	0.0381	0.0100	mg/l		0.0369			3.20	20	
Matrix Spike (2A07011-MS1)										
					Source: B2A0040-01					
Zinc	0.235	0.0100	mg/l	0.200	0.0369	99.0	75-125			

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Project: SR405 Vortechs
 Project Number: Not Provided
 Project Manager: James Packman

Reported:
 01/15/02 17:15

Dissolved Metals by EPA 200 Series Methods - Quality Control
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2A10022: Prepared 01/10/02 Using EPA 3005A										
Blank (2A10022-BLK1)										
Cu	ND	0.0100	mg/l							
LCS (2A10022-BS1)										
Cu	0.212	0.0100	mg/l	0.200		106	85-115			
LCS Dup (2A10022-BSD1)										
Zinc	0.201	0.0100	mg/l	0.200		100	85-115	5.33	15	
Duplicate (2A10022-DUP1)										
					Source: B2A0054-25					
Zinc	ND	0.0100	mg/l		ND			1.31	20	
Matrix Spike (2A10022-MS1)										
					Source: B2A0054-25					
Cu	0.208	0.0100	mg/l	0.200	ND	101	75-125			
Matrix Spike (2A10022-MS2)										
					Source: B2A0072-02					
Cu	0.217	0.0100	mg/l	0.200	0.0134	102	75-125			
Matrix Spike Dup (2A10022-MSD1)										
					Source: B2A0054-25					
Zinc	0.208	0.0100	mg/l	0.200	ND	101	75-125	0.00	20	

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Project: SR405 Vortechs
 Project Number: Not Provided
 Project Manager: James Packman

Reported:
 01/15/02 17:15

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2A02044: Prepared 01/02/02 Using General Preparation										
Duplicate (2A02044-DUP1)					Source: B2A0016-02					
pH	7.19		pH Units		7.16			0.418	10	
Batch 2A02046: Prepared 01/02/02 Using General Preparation										
Blank (2A02046-BLK1)										
Turbidity	ND	1.00	NTU							
LCS (2A02046-BS1)										
Turbidity	18.7	1.00	NTU	20.0		93.5	90-110			
LCS Dup (2A02046-BSD1)										
Turbidity	18.9	1.00	NTU	20.0		94.5	90-110	1.06	20	
Duplicate (2A02046-DUP1)					Source: B2A0016-02					
Turbidity	41.6	1.00	NTU		42.9			3.08	20	
Batch 2A05002: Prepared 01/04/02 Using General Preparation										
Blank (2A05002-BLK1)										
Orthophosphate-phosphorus	ND	0.00200	mg/l							
LCS (2A05002-BS1)										
Orthophosphate-phosphorus	0.0480	0.00200	mg/l	0.0500		96.0	90-110			
LCS Dup (2A05002-BSD1)										
Orthophosphate-phosphorus	0.0475	0.00200	mg/l	0.0500		95.0	90-110	1.05	20	

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Taylor Associates Inc
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Project: SR405 Vortechs
 Project Number: Not Provided
 Project Manager: James Packman

Reported:
 01/15/02 17:15

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2A05002: Prepared 01/04/02 Using General Preparation										
Matrix Spike (2A05002-MS1)					Source: B2A0016-01					
Orthophosphate-phosphorus	0.0506	0.00200	mg/l	0.0500	0.00339	94.4	80-120			
Matrix Spike Dup (2A05002-MSD1)					Source: B2A0016-01					
Orthophosphate-phosphorus	0.0508	0.00200	mg/l	0.0500	0.00339	94.8	80-120	0.394	25	
Batch 2A08002: Prepared 01/03/02 Using General Preparation										
Blank (2A08002-BLK1)										
Total Suspended Solids	ND	4.0	mg/l							
Duplicate (2A08002-DUP1)					Source: B2A0016-01					
Total Suspended Solids	230	4.0	mg/l		230			0.0	19	
Batch 2A08015: Prepared 01/08/02 Using EPA 3010A										
Blank (2A08015-BLK1)										
Hardness	ND	1.00mg eq. CaCO3/L								
LCS (2A08015-BS1)										
Hardness	63.2	1.00mg eq. CaCO3/L		66.2		95.5	70-130			
LCS Dup (2A08015-BSD1)										
Hardness	63.5	1.00mg eq. CaCO3/L		66.2		95.9	70-130	0.474	20	
Matrix Spike (2A08015-MS1)					Source: B1L0659-10					
Hardness	321	1.00mg eq. CaCO3/L		66.2	263	87.6	75-125			

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Taylor Associates Inc
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 Seattle WA/USA, 98103

Project: SR405 Vortechs
 Project Number: Not Provided
 Project Manager: James Packman

Reported:
 01/15/02 17:15

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
---------	--------	-----------------	-------	-------------	---------------	------	-------------	-----	-----------	-------

Batch 2A08015: Prepared 01/08/02 Using EPA 3010A

Matrix Spike Dup (2A08015-MSD1)

Source: B1L0659-10

Hardness	319	1.00mg eq. CaCO3/L	66.2	263	84.6	75-125	0.625	20	
----------	-----	--------------------	------	-----	------	--------	-------	----	--

Batch 2A10001: Prepared 01/08/02 Using General Preparation

Blank (2A10001-BLK1)

Phosphorus	ND	0.00500	mg/l						
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LCS (2A10001-BS1)

Phosphorus	0.148	0.00500	mg/l	0.150	98.7	90-120			
------------	-------	---------	------	-------	------	--------	--	--	--

LCS Dup (2A10001-BSD1)

Phosphorus	0.151	0.00500	mg/l	0.150	101	90-120	2.01	20	
------------	-------	---------	------	-------	-----	--------	------	----	--

Matrix Spike (2A10001-MS1)

Source: B2A0039-04

Phosphorus	0.0517	0.00500	mg/l	0.0250	0.0236	112	60-139		
------------	--------	---------	------	--------	--------	-----	--------	--	--

Matrix Spike Dup (2A10001-MSD1)

Source: B2A0039-04

Phosphorus	0.0485	0.00500	mg/l	0.0250	0.0236	99.6	60-139	6.39	25
------------	--------	---------	------	--------	--------	------	--------	------	----

Batch 2A15024: Prepared 01/14/02 Using General Preparation

Blank (2A15024-BLK1)

Phosphorus	ND	0.00500	mg/l						
------------	----	---------	------	--	--	--	--	--	--

LCS (2A15024-BS1)

Phosphorus	0.136	0.00500	mg/l	0.150	90.7	90-120			
------------	-------	---------	------	-------	------	--------	--	--	--

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Taylor Associates Inc
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Project: SR405 Vortechs
 Project Number: Not Provided
 Project Manager: James Packman

Reported:
 01/15/02 17:15

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2A15024: Prepared 01/14/02 Using General Preparation										
SCS Dup (2A15024-BSD1)										
Phosphorus	0.137	0.00500	mg/l	0.150		91.3	90-120	0.733	20	
Matrix Spike (2A15024-MS1)										
					Source: B2A0105-02					
Phosphorus	2.50	0.125	mg/l	0.626	1.92	92.7	60-139			
Matrix Spike Dup (2A15024-MSD1)										
					Source: B2A0105-02					
Phosphorus	2.42	0.125	mg/l	0.626	1.92	79.9	60-139	3.25	25	

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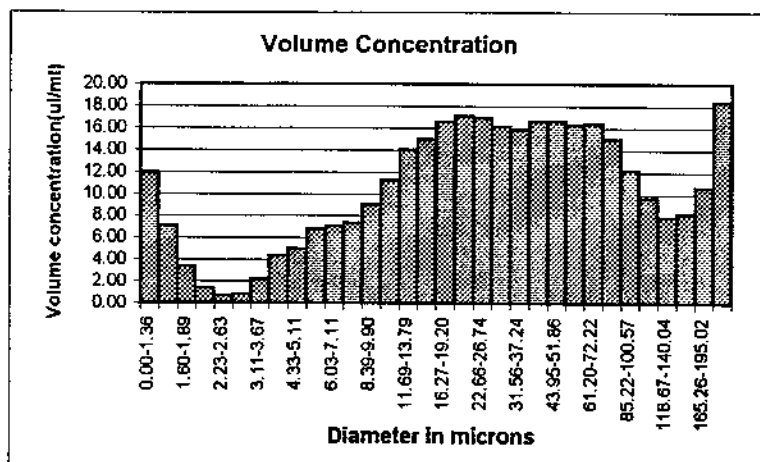
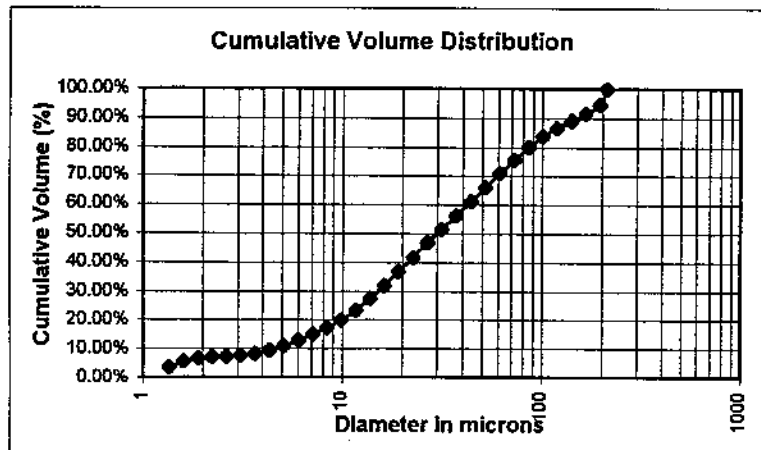
Appendix B- field sheets.xls, CoC - SR405

Particle Size Distribution Analysis Results

Report Prepared for:
Ingrid Wertz
Taylor Associates
Tel: 206.633.4486

Analysis Performed by:
Lynel Rabago
University of Washington
Department of Civil Engineering
Contact: Dr. David Stensel
Tel: 206.543.9358

Project ID: SR405 Vortechinics
Sample ID: VOR-010202-IN-PSD
Date and Time Collected: 1/2/02 12:43
Date and Time of PSD Analysis: 1/3/02 11:39



Size Range (microns)	Volume Concentration (ul / l)	Cumulative Volume (%)	Mass (mg)
0.00-1.36	11.95	3.53%	7.94
1.36-1.60	7.08	5.63%	4.70
1.60-1.89	3.39	6.63%	2.25
1.89-2.23	1.42	7.05%	0.94
2.23-2.63	0.73	7.27%	0.49
2.63-3.11	0.85	7.52%	0.57
3.11-3.67	2.18	8.16%	1.45
3.67-4.33	4.36	9.45%	2.90
4.33-5.11	5.00	10.93%	3.32
5.11-6.03	6.81	12.95%	4.52
6.03-7.11	7.10	15.05%	4.72
7.11-8.39	7.40	17.24%	4.92
8.39-9.90	9.02	19.91%	6.00
9.90-11.69	11.25	23.23%	7.47
11.69-13.79	14.05	27.39%	9.33
13.79-16.27	14.99	31.82%	9.96
16.27-19.20	16.56	36.72%	11.00
19.20-22.66	17.11	41.78%	11.36
22.66-26.74	16.93	46.79%	11.25
26.74-31.56	16.18	51.57%	10.75
31.56-37.24	15.85	56.26%	10.53
37.24-43.95	16.65	61.18%	11.06
43.95-51.86	16.63	66.10%	11.05
51.86-61.20	16.28	70.92%	10.81
61.20-72.22	16.43	75.78%	10.91
72.22-85.22	15.01	80.21%	9.97
85.22-100.57	12.13	83.80%	8.06
100.57-118.67	9.66	86.66%	6.42
118.67-140.04	7.92	89.00%	5.26
140.04-165.26	8.18	91.42%	5.43
165.26-195.02	10.59	94.55%	7.04
195.02-212	18.42	100.00%	12.23
Total	338.10		224.60

Computed Statistics:

Weight Mean = 57.24 microns
D₁₀ = 4.33 microns
D₅₀ = 26.74 microns
D₉₀ = 140.04 microns

Volume of Sample: 925 ml
Volume of Dilution: 2075 ml added

Comments: ~10ml of the <212 fraction was spilled after PSA so only TSS value should be affected.
The TSS value for this size fraction will consequently be slightly lower as a result.

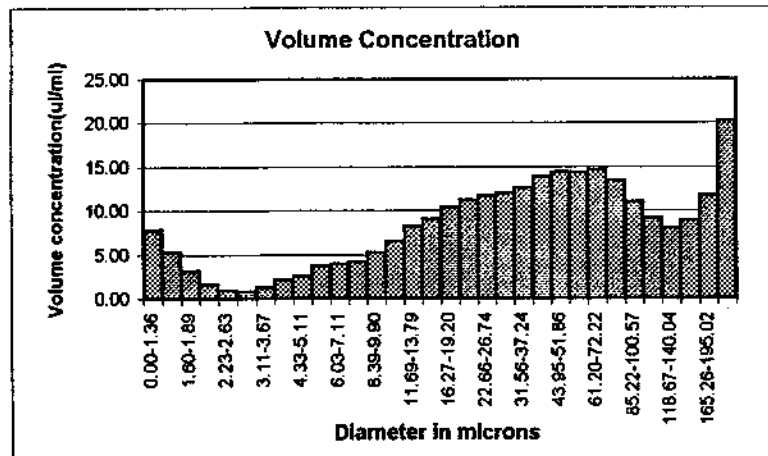
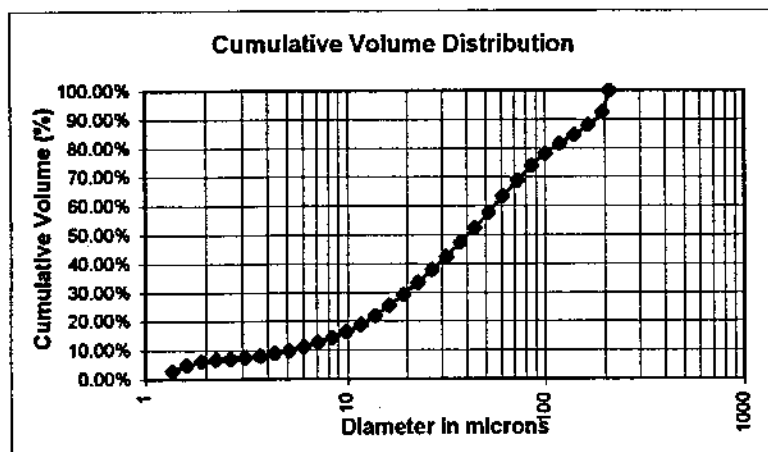
Size Range (microns)	Mass of TSS (mg)	% Mass TSS
< 212	224.60	85.17%
212-425	15.80	5.99%
425-850	6.80	2.58%
>850	16.50	6.26%
Total	263.70	100.00%

Particle Size Distribution Analysis Results

Report Prepared for:
Ingrid Weltz
Taylor Associates
Tel: 206.633.4486

Analysis Performed by:
Lynel Rabago
University of Washington
Department of Civil Engineering
Contact: Dr. David Stensel
Tel: 206.543.9358

Project ID: SR405 Vortechinics
Sample ID: VOR-010202-OUT-PSD
Date and Time Collected: 1/2/02 12:45
Date and Time of PSD Analysis: 1/3/02 3:25



Size Range (microns)	Volume Concentration (ul/l)	Cumulative Volume (%)	Mass (mg)
0.00-1.36	7.88	2.98%	3.65
1.36-1.60	5.34	5.00%	2.47
1.60-1.89	3.17	6.20%	1.47
1.89-2.23	1.72	6.85%	0.80
2.23-2.63	0.98	7.22%	0.45
2.63-3.11	0.80	7.52%	0.37
3.11-3.67	1.28	8.00%	0.59
3.67-4.33	2.17	8.83%	1.01
4.33-5.11	2.57	9.80%	1.19
5.11-6.03	3.74	11.21%	1.73
6.03-7.11	3.95	12.70%	1.83
7.11-8.39	4.24	14.30%	1.96
8.39-9.90	5.34	16.32%	2.47
9.90-11.69	6.59	18.81%	3.05
11.69-13.79	8.27	21.93%	3.83
13.79-16.27	9.04	25.35%	4.18
16.27-19.20	10.41	29.28%	4.82
19.20-22.66	11.19	33.51%	5.18
22.66-26.74	11.69	37.93%	5.41
26.74-31.56	12.00	42.47%	5.56
31.56-37.24	12.58	47.22%	5.82
37.24-43.95	13.89	52.47%	6.43
43.95-51.86	14.38	57.90%	6.66
51.86-61.20	14.31	63.31%	6.62
61.20-72.22	14.62	68.84%	6.77
72.22-85.22	13.44	73.92%	6.22
85.22-100.57	11.00	78.07%	5.09
100.57-118.67	9.16	81.54%	4.24
118.67-140.04	8.06	84.58%	3.73
140.04-165.26	8.90	87.95%	4.12
165.26-195.02	11.72	92.37%	5.42
195.02-212	20.18	100.00%	9.34
Total	264.61		122.50

Computed Statistics:

Weight Mean = 69.19 microns
D₁₀ = 5.11 microns
D₅₀ = 37.24 microns
D₉₀ = 165.26 microns

Volume of Sample: 950 ml
Volume of Dilution: 1050 ml added
Comments: 1/0/00

Size Range (microns)	Mass of TSS (mg)	% Mass TSS
< 212	122.50	92.80%
212-425	2.60	1.97%
425-850	2.50	1.89%
>850	4.40	3.33%
Total	132.00	100.00%

SITE VISIT SHEET (SR 405 Vortechs™ Monitoring)

Date/Time 12/31/01 12:30 Field Staff JP Weather cloudy + misting

Pre-Storm Visit - or - Post-Storm Visit (circle one)

INLET

Check Current Readings / Download:

ISCO Time? reset (Y/N)? 13:00, N 12/31
 Time downloaded level
0.026'

OUTLET

Check Current Readings / Download:

ISCO Time? reset (Y/N)? 12:47 12/31
 Level (ft.) 0.208
 Velocity (f/s) 0.34
 Flow (cfs) 37385
 Total Flow (cf) 37385
 Sig/Spec str. 0/0
 Time downloaded offset = 0.145 - 1h

Pre - Storm Visit

INLET

Battery (V) 12.30v
 Clean bottle (Y/N)? Y
 Pump tubing ok (Y/N)? Replaced? Y
 Sampler tubing ok (Y/N)? Y
 Strainer ok? -
 Ext. desiccant ok (Y/N)? Changed? Y
 Int. desiccant ok (Y/N)? Changed? Y
 Measure Dn level? Ok? -
 Sample Volume (ml) 200 ml
 Inspect Rain Gage Y - ok
 Sampler enabled? (Y/N) Y

OUTLET

Battery (V) 12.30v
 Clean bottle (Y/N)? Y
 Pump tubing ok (Y/N)? Replaced? N
 Sampler tubing ok (Y/N)? Y
 Strainer ok? -
 Ext. desiccant ok (Y/N)? Changed? Y
 Int. desiccant ok (Y/N)? Changed? Y
 Measure Dn level? Ok? -
 Enable level (ft) > 0.55
 Pacing (cf) / Sample Volume (ml) 400
 Sampler enabled? (Y/N) Y

no delay to start

Delay to start 17:00 Tue not 54 12/31

Post - Storm Visit

INLET

Equipment Ran Completely? _____
 Sampler Enabled (date/time)? _____
 Composite Began (date/time)? _____
 Number of subsamples taken? _____
 Any subsample collection errors? _____
 Last Sample (date/time)? _____
 Est. Sample Volume Collected (ml) _____
 Sample ID? _____

OUTLET

Equipment Ran Completely? _____
 Sampler Enabled (date/time)? _____
 Composite Began (date/time)? _____
 Number of subsamples taken? _____
 Any subsample collection errors? _____
 Last Sample (date/time)? _____
 Est. Sample Volume Collected (ml) _____
 Sample ID? _____

Y/N	Value	Storm Validation Criteria
	hrs. (if known)	Was there an antecedent dry period of at least six hours?
	in.	Was total rainfall greater than or equal to 0.25"?
	hrs.	Was runoff duration greater than one hour?

Y/N	Value	Flow-weighted Composite Sample Validation Criteria
	% (approx.)	Was greater than 75% of the total volume of the storm sampled?
	# subsample	Were at least 10 sub-samples collected at the inlet?
	# subsample	Were at least 10 sub-samples collected at the outlet?

Was a field duplicate collected? If so, Sample ID. _____ Field blank collected? If so, Sample ID. _____

NOTES (including any problems with equipment or maintenance activities performed):

SITE VISIT SHEET (SR 405 Vortechs™ Monitoring)

Date/Time 1/2/02 13:00 Field Staff JP Weather ptly cloudy

Pre-Storm Visit - or Post-Storm Visit (circle one)

INLET

Check Current Readings / Download:

ISCO Time? reset (Y/N)? 13:10
Time downloaded 13:40
level 0.026

OUTLET

Check Current Readings / Download:

ISCO Time? reset (Y/N)? 13:17, N
Level (ft.) 0.222
Velocity (f/s) 0.11
Flow (cfs) 0.025
Total Flow (cf) 9327
Sig/Spec str. 37.88%
Time downloaded 13:30

INLET

Battery (V) _____
Clean bottle (Y/N)? _____
Pump tubing ok (Y/N)? Replaced? _____
Sampler tubing ok (Y/N)? _____
Strainer ok? _____
Ext. desiccant ok (Y/N)? Changed? _____
Int. desiccant ok (Y/N)? Changed? _____
Measure Dn level? Ok? _____
Sample Volume (ml) _____
Inspect Rain Gage _____
Sampler enabled? (Y/N) _____

Pre - Storm Visit

OUTLET

Battery (V) _____
Clean bottle (Y/N)? _____
Pump tubing ok (Y/N)? Replaced? _____
Sampler tubing ok (Y/N)? _____
Strainer ok? _____
Ext. desiccant ok (Y/N)? Changed? _____
Int. desiccant ok (Y/N)? Changed? _____
Measure Dn level? Ok? _____
Enable level (ft) _____
Pacing (cf) / Sample Volume (ml) _____
Sampler enabled? (Y/N) _____

Post - Storm Visit

INLET

Equipment Ran Completely? N
Sampler Enabled (date/time)? 23:23 1/1
Composite Began (date/time)? 23:23
Number of subsamples taken? 15 (14 + 13?)
Any subsample collection errors? Y
Last Sample (date/time)? 12:41 1/2
Est. Sample Volume Collected (ml) 3.2 L
Sample ID? VOR-010202-IV

OUTLET

Equipment Ran Completely? N
Sampler Enabled (date/time)? 23:25 1/1
Composite Began (date/time)? 23:25
Number of subsamples taken? 15
Any subsample collection errors? N
Last Sample (date/time)? 12:43 1/2
Est. Sample Volume Collected (ml) 3.0 L
Sample ID? VOR-010202-01

Y/N	Value	Storm Validation Criteria
<u>N</u>	hrs. (if known)	Was there an antecedent dry period of at least six hours?
<u>Y</u>	<u>0.44</u> in.	Was total rainfall greater than or equal to 0.25"?
<u>Y</u>	<u>2.4</u> hrs.	Was runoff duration greater than one hour? <u>13:30 - 13:40</u>

Y/N	Value	Flow-weighted Composite Sample Validation Criteria
<u>N</u>	<u>→</u> % (approx.)	Was greater than 75% of the total volume of the storm sampled?
<u>Y</u>	<u>15</u> # subsample	Were at least 10 sub-samples collected at the inlet?
<u>Y</u>	<u>15</u> # subsample	Were at least 10 sub-samples collected at the outlet?

Rain 0.27 in.
= 61%

Flow
10352/13210
78%

Was a field duplicate collected? If so, Sample ID. _____ Field blank collected? If so, Sample ID. _____

NOTES (including any problems with equipment or maintenance activities performed):

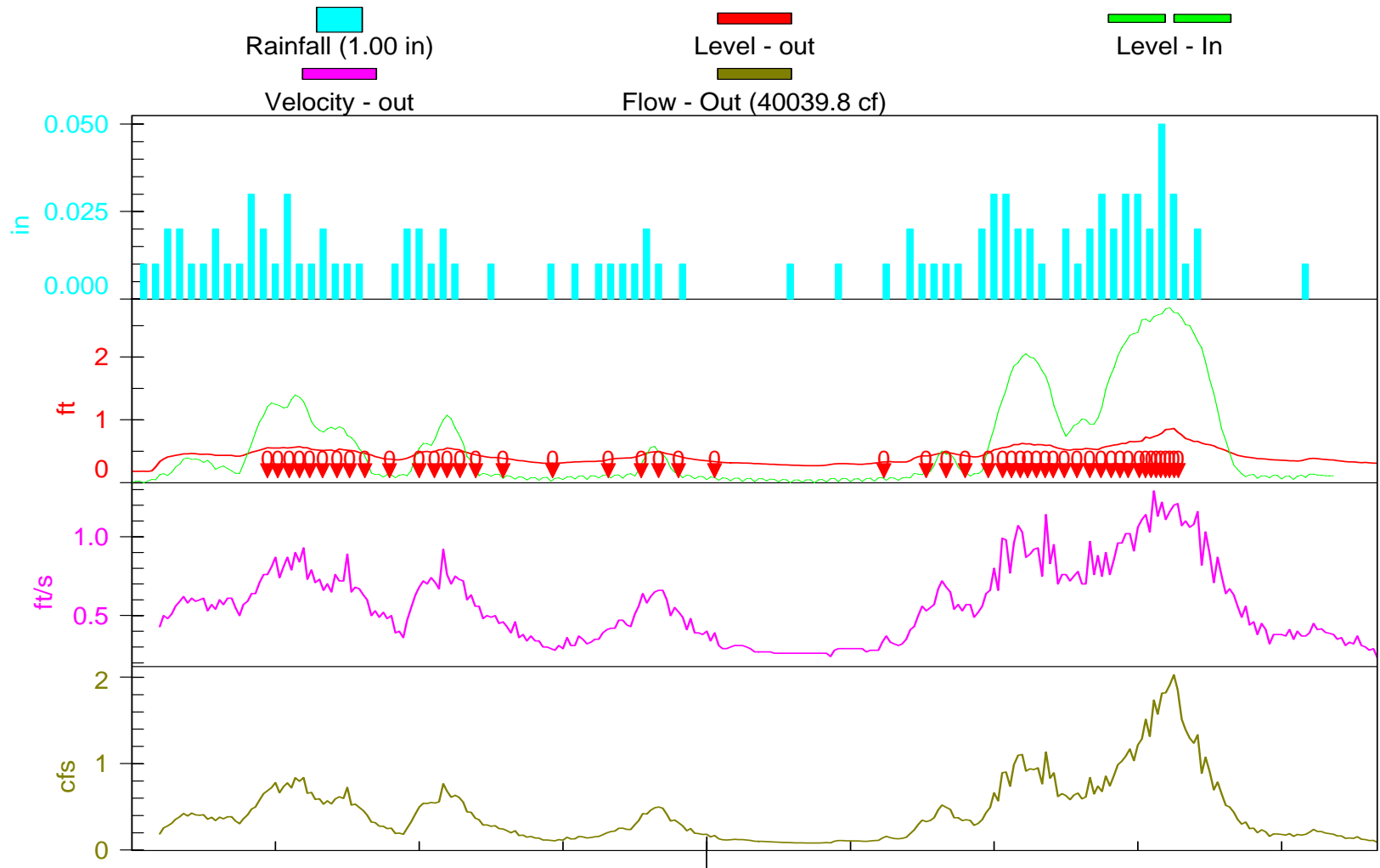
- pump tubing replaced on inlet & reset pump counter
- Took sample in eventh missed 15 part of event

STORM EVENT

NUMBER 8

SR 405 Vortech

Storm #8, 6-7 January 2002



Jan 2002

7 Mon
1/6/02 12:00:00 PM - 1/7/02 2:00:00 PM

PROJECT NARRATIVE for B2A0072

Client: Taylor Associates
Project Manager: James Packman
Project Name: SR405 Vortechs
Project Number: Not Provided

1.0 DESCRIPTION OF CASE

Two (2) water sample were received for the analysis of:

- Total Zinc by EPA 200.8
- Dissolved Zinc by EPA 200.8
- Hardness by SM2340B
- Orthophosphate by EPA 365.2
- Total Phosphorous by EPA 365.2
- Total Suspended Solids by EPA 160.2
- Turbidity
- pH by EPA 150.1

2.0 COMMENTS ON SAMPLE RECEIPT

The samples were received and logged in on 7th January 2002 at a temperature of 10.8 Degrees C; this is outside the recommended temperature range of 2 to 6 Degrees C. Since the samples were received shortly after collection and may not have had time to equilibrate with the coolant a temperature range of 2 to 15 Degrees C is considered acceptable.


Preparation and Analysis

There were no anomalies associated with the preparation and analysis with all QA being within method established criteria. However the following analyses do need to be commented on

Dissolved Zinc

The dissolved metals were filtered and preserved with Nitric Acid in house prior to analysis.

"I certify that this data package is in compliance with the Contract both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Director or his designee, as verified by the following signature."



Amar Gill
Project Manager
North Creek Analytical



Seattle 11720 North Creek Pkwy N, Suite 400, Bothell, WA 98011-8244
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503.906.9200 fax 503.906.9210
Bend 20332 Empire Avenue, Suite F-1, Bend, OR 97701-5711
541.383.9310 fax 541.382.7588

Taylor Associates Inc
7104 Greenwood Ave N
Seattle WA/USA, 98103

Project: SR405 Vortechs
Project Number: Not Provided
Project Manager: James Packman

Reported:
01/18/02 10:31

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
VOR-010702-IN	B2A0072-01	Water	01/07/02 09:52	01/07/02 14:20
VOR-010702-OUT	B2A0072-02	Water	01/07/02 09:53	01/07/02 14:20

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Environmental Laboratory Network

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Taylor Associates Inc
 7104 Greenwood Ave N
 Seattle WA/USA, 98103

Project: SR405 Vortechs
 Project Number: Not Provided
 Project Manager: James Packman

Reported:
 01/18/02 10:31

Total Metals by EPA 200 Series Methods
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
VOR-010702-IN (B2A0072-01) Water Sampled: 01/07/02 09:52 Received: 01/07/02 14:20									
Zinc	0.0684	0.0100	mg/l	1	2A08029	01/08/02	01/09/02	EPA 200.8	
VOR-010702-OUT (B2A0072-02) Water Sampled: 01/07/02 09:53 Received: 01/07/02 14:20									
Zinc	0.0636	0.0100	mg/l	1	2A08029	01/08/02	01/09/02	EPA 200.8	

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Seattle WA/USA, 98103

Project: SR405 Vortechs
Project Number: Not Provided
Project Manager: James Packman

Reported:
01/18/02 10:31

Dissolved Metals by EPA 200 Series Methods
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
VOR-010702-IN (B2A0072-01) Water Sampled: 01/07/02 09:52 Received: 01/07/02 14:20									
Zinc	0.0183	0.0100	mg/l	1	2A10022	01/10/02	01/10/02	EPA 200.8	
VOR-010702-OUT (B2A0072-02) Water Sampled: 01/07/02 09:53 Received: 01/07/02 14:20									
Zinc	0.0134	0.0100	mg/l	1	2A10022	01/10/02	01/10/02	EPA 200.8	

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Environmental Laboratory Network

Page 3 of 11

Taylor Associates Inc
 7104 Greenwood Ave N
 Seattle WA/USA, 98103

Project: SR405 Vortechs
 Project Number: Not Provided
 Project Manager: James Packman

Reported:
 01/18/02 10:31

Conventional Chemistry Parameters by APHA/EPA Methods
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
VOR-010702-IN (B2A0072-01) Water Sampled: 01/07/02 09:52 Received: 01/07/02 14:20									
Hardness	28.7	1.00	mg eq. CaCO ₃ /L	1	2A15015	01/15/02	01/17/02	SM 2340B	
Orthophosphate-phosphorus	0.0275	0.00200	mg/l	"	2A08030	01/08/02	01/08/02	EPA 365.2	
pH	7.02		pH Units	"	2A07050	01/07/02	01/07/02	EPA 150.1	
Total Suspended Solids	80	4.0	mg/l	"	2A11022	01/08/02	01/09/02	EPA 160.2	
Turbidity	32.4	1.00	NTU	"	2A07049	01/07/02	01/07/02	EPA 180.1	
VOR-010702-IN (B2A0072-01RE1) Water Sampled: 01/07/02 09:52 Received: 01/07/02 14:20									
Phosphorus	0.540	0.0250	mg/l	5	2A15024	01/14/02	01/15/02	EPA 365.2	
VOR-010702-OUT (B2A0072-02) Water Sampled: 01/07/02 09:53 Received: 01/07/02 14:20									
Hardness	29.1	1.00	mg eq. CaCO ₃ /L	1	2A15015	01/15/02	01/17/02	SM 2340B	
Orthophosphate-phosphorus	0.00640	0.00200	mg/l	"	2A08030	01/08/02	01/08/02	EPA 365.2	
Phosphorus	0.184	0.00500	"	"	2A10002	"	"	"	
pH	7.12		pH Units	"	2A07050	01/07/02	01/07/02	EPA 150.1	
Total Suspended Solids	63	4.0	mg/l	"	2A11022	01/08/02	01/09/02	EPA 160.2	
Turbidity	31.3	1.00	NTU	"	2A07049	01/07/02	01/07/02	EPA 180.1	

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Taylor Associates Inc
 7104 Greenwood Ave N
 Seattle WA/USA, 98103

Project: SR405 Vortechs
 Project Number: Not Provided
 Project Manager: James Packman

Reported:
 01/18/02 10:31

Total Metals by EPA 200 Series Methods - Quality Control
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2A08029: Prepared 01/08/02 Using EPA 200 Series										
Blank (2A08029-BLK1)										
Zinc	ND	0.0100	mg/l							
LCS (2A08029-BS1)										
Zinc	0.214	0.0100	mg/l	0.200		107	85-115			
LCS Dup (2A08029-BSD1)										
Zinc	0.211	0.0100	mg/l	0.200		106	85-115	1.41	15	
Duplicate (2A08029-DUP1) Source: B2A0036-01										
Zinc	0.0914	0.0100	mg/l		0.0902			1.32	20	
Matrix Spike (2A08029-MS1) Source: B2A0036-01										
Zinc	0.285	0.0100	mg/l	0.200	0.0902	97.4	75-125			
Matrix Spike (2A08029-MS2) Source: B2A0037-01										
Zinc	0.260	0.0100	mg/l	0.200	0.0642	97.9	75-125			

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Taylor Associates Inc
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 Seattle WA/USA, 98103

Project: SR405 Vortechs
 Project Number: Not Provided
 Project Manager: James Packman

Reported:
 01/18/02 10:31

Dissolved Metals by EPA 200 Series Methods - Quality Control
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2A10022: Prepared 01/10/02 Using EPA 3005A										
Blank (2A10022-BLK1)										
Zinc	ND	0.0100	mg/l							
LCS (2A10022-BS1)										
Zinc	0.212	0.0100	mg/l	0.200		106	85-115			
LCS Dup (2A10022-BSD1)										
Zinc	0.201	0.0100	mg/l	0.200		100	85-115	5.33	15	
Duplicate (2A10022-DUP1) Source: B2A0054-25										
Zinc	ND	0.0100	mg/l		ND			1.31	20	
Matrix Spike (2A10022-MS1) Source: B2A0054-25										
Zinc	0.208	0.0100	mg/l	0.200	ND	101	75-125			
Matrix Spike (2A10022-MS2) Source: B2A0072-02										
Zinc	0.217	0.0100	mg/l	0.200	0.0134	102	75-125			
Matrix Spike Dup (2A10022-MSD1) Source: B2A0054-25										
Zinc	0.208	0.0100	mg/l	0.200	ND	101	75-125	0.00	20	

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Amar Gill, Project Manager

North Creek Analytical, Inc.
 Environmental Laboratory Network

Taylor Associates Inc
 7104 Greenwood Ave N
 Seattle WA/USA, 98103

Project: SR405 Vortechs
 Project Number: Not Provided
 Project Manager: James Packman

Reported:
 01/18/02 10:31

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2A07049: Prepared 01/07/02 Using General Preparation										
Blank (2A07049-BLK1)										
Turbidity	ND	1.00	NTU							
LCS (2A07049-BS1)										
Turbidity	18.8	1.00	NTU	20.0		94.0	90-110			
LCS Dup (2A07049-BSD1)										
Turbidity	18.8	1.00	NTU	20.0		94.0	90-110	0.00	20	
Duplicate (2A07049-DUP1) Source: B2A0067-01										
Turbidity	18.2	1.00	NTU		18.8			3.24	20	
Batch 2A07050: Prepared 01/07/02 Using General Preparation										
Duplicate (2A07050-DUP1) Source: B2A0072-01										
	7.06		pH Units		7.02			0.568	10	
Batch 2A08030: Prepared 01/08/02 Using General Preparation										
Blank (2A08030-BLK1)										
Orthophosphate-phosphorus	ND	0.00200	mg/l							
LCS (2A08030-BS1)										
Orthophosphate-phosphorus	0.158	0.00200	mg/l	0.150		105	90-110			
LCS Dup (2A08030-BSD1)										
Orthophosphate-phosphorus	0.159	0.00200	mg/l	0.150		106	90-110	0.631	20	

North Creek Analytical - Bothell

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Amar Gill, Project Manager

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 Environmental Laboratory Network

Page 7 of 11

Taylor Associates Inc
 7104 Greenwood Ave N
 Seattle WA/USA, 98103

Project: SR405 Vortechs
 Project Number: Not Provided
 Project Manager: James Packman

Reported:
 01/18/02 10:31

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2A08030: Prepared 01/08/02 Using General Preparation										
Matrix Spike (2A08030-MS1)					Source: B2A0072-02					
Orthophosphate-phosphorus	0.0584	0.00200	mg/l	0.0499	0.00640	104	80-120			
Matrix Spike Dup (2A08030-MSD1)					Source: B2A0072-02					
Orthophosphate-phosphorus	0.0584	0.00200	mg/l	0.0499	0.00640	104	80-120	0.00	25	
Batch 2A10002: Prepared 01/08/02 Using General Preparation										
Blank (2A10002-BLK1)										
Phosphorus	ND	0.00500	mg/l							
LCS (2A10002-BS1)										
Phosphorus	0.147	0.00500	mg/l	0.150		98.0	90-120			
LCS Dup (2A10002-BSD1)										
Phosphorus	0.149	0.00500	mg/l	0.150		99.3	90-120	1.35	20	
Matrix Spike (2A10002-MS1)					Source: B2A0072-01					
Phosphorus	0.721	0.0250	mg/l	0.0250	0.599	488	60-139			Q-15
Matrix Spike Dup (2A10002-MSD1)					Source: B2A0072-01					
Phosphorus	0.718	0.0250	mg/l	0.0250	0.599	476	60-139	0.417	25	Q-15
Batch 2A11022: Prepared 01/08/02 Using General Preparation										
Blank (2A11022-BLK1)										
Total Suspended Solids	ND	4.0	mg/l							

North Creek Analytical - Bothell

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



Amar Gill, Project Manager

Taylor Associates Inc
 7104 Greenwood Ave N
 Seattle WA/USA, 98103

Project: SR405 Vortechs
 Project Number: Not Provided
 Project Manager: James Packman

Reported:
 01/18/02 10:31

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2A11022: Prepared 01/08/02 Using General Preparation										
Duplicate (2A11022-DUP1)					Source: B2A0071-01					
Total Suspended Solids	ND	4.0	mg/l		ND			40	19	Q-07
Batch 2A15015: Prepared 01/15/02 Using EPA 3010A										
Blank (2A15015-BLK1)										
Hardness	ND	1.00mg eq. CaCO3/L								
LCS (2A15015-BS1)										
Hardness	65.4	1.00mg eq. CaCO3/L		66.2		98.8	70-130			
LCS Dup (2A15015-BSD1)										
Hardness	65.3	1.00mg eq. CaCO3/L		66.2		98.6	70-130	0.153	20	
Matrix Spike (2A15015-MS1)										
Hardness	597	1.00mg eq. CaCO3/L		66.2	529	103	75-125			
Matrix Spike Dup (2A15015-MSD1)										
Hardness	604	1.00mg eq. CaCO3/L		66.2	529	113	75-125	1.17	20	
Batch 2A15024: Prepared 01/14/02 Using General Preparation										
Blank (2A15024-BLK1)										
Phosphorus	ND	0.00500	mg/l							
LCS (2A15024-BS1)										
Phosphorus	0.136	0.00500	mg/l	0.150		90.7	90-120			

North Creek Analytical - Bothell

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Amar Gill, Project Manager



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Portland 9405 SW Nimbus Avenue, Beaverton, OR 97008-7132
503.906.9200 fax 503.906.9210
Bend 20332 Empire Avenue, Suite F-1, Bend, OR 97701-5711
541.383.9310 fax 541.382.7588

Taylor Associates Inc
7104 Greenwood Ave N
Seattle WA/USA, 98103

Project: SR405 Vortechs
Project Number: Not Provided
Project Manager: James Packman

Reported:
01/18/02 10:31

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC Limits	RPD	RPD Limit	Notes
Batch 2A15024: Prepared 01/14/02 Using General Preparation									
LCS Dup (2A15024-BSD1)									
Phosphorus	0.137	0.00500	mg/l	0.150		91.3 90-120	0.733	20	
Matrix Spike (2A15024-MS1) Source: B2A0105-02									
Phosphorus	2.50	0.125	mg/l	0.626	1.92	92.7 60-139			
Matrix Spike Dup (2A15024-MSD1) Source: B2A0105-02									
Phosphorus	2.42	0.125	mg/l	0.626	1.92	79.9 60-139	3.25	25	

North Creek Analytical - Bothell

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Amar Gill, Project Manager

North Creek Analytical, Inc.
Environmental Laboratory Network

Page 10 of 11

Sample Collection by: Client:

Laboratory: North Creek Analytical
Contact: Amar Gill
Tel: 425.420.9232

or

University of Washington
Contact: David Stensel
Tel: 206.543.9358

Date recorded by:

Sample ID

[illegible]

Relinquished by:

Relinquished by:

Signature	
Printed Name	James Packman
Company	Taylor Assoc.
Date/Time	1/2/02 14:20

Signature
Printed Name
Company
Date/Time

Received by:

Received by:

Signature

Signature

Printed Name _____

Printed Name

Company

Company

Date/Time

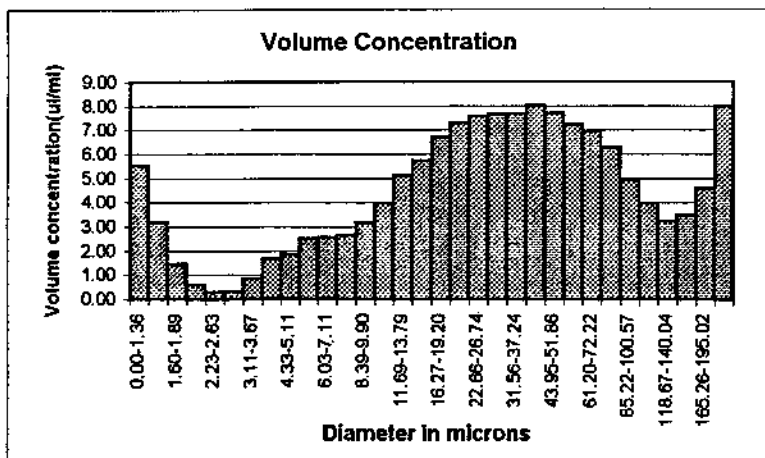
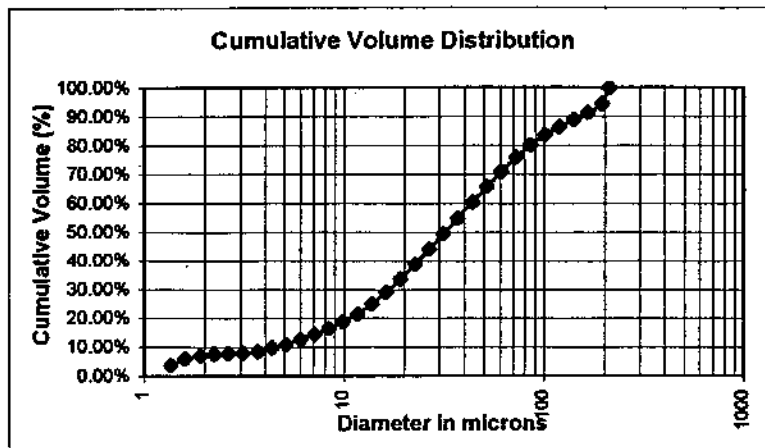
Date/Time

Particle Size Distribution Analysis Results

Report Prepared for:
Ingrid Weltz
Taylor Associates
Tel: 206.633.4486

Analysis Performed by:
Lynel Rabago
University of Washington
Department of Civil Engineering
Contact: Dr. David Stensel
Tel: 206.543.9358

Project ID: SR405 Vortechs
Sample ID: VOR-010702-IN
Date and Time Collected: 1/7/02 0.411111111
Date and Time of PSD Analysis: 1/8/02 0.565277778



Size Range (microns)	Volume Concentration (u/l)	Cumulative Volume (%)	Mass (mg)
0.00-1.36	5.52	3.87%	3.14
1.36-1.60	3.18	6.10%	1.81
1.60-1.89	1.47	7.12%	0.84
1.89-2.23	0.59	7.53%	0.33
2.23-2.63	0.29	7.74%	0.16
2.63-3.11	0.33	7.97%	0.19
3.11-3.67	0.84	8.56%	0.48
3.67-4.33	1.66	9.72%	0.95
4.33-5.11	1.86	11.02%	1.06
5.11-6.03	2.52	12.79%	1.44
6.03-7.11	2.57	14.59%	1.46
7.11-8.39	2.65	16.44%	1.51
8.39-9.90	3.18	18.67%	1.81
9.90-11.69	3.98	21.46%	2.27
11.69-13.79	5.12	25.04%	2.91
13.79-16.27	5.74	29.06%	3.27
16.27-19.20	6.68	33.74%	3.80
19.20-22.66	7.29	38.85%	4.15
22.66-26.74	7.58	44.15%	4.31
26.74-31.56	7.64	49.50%	4.35
31.56-37.24	7.68	54.87%	4.37
37.24-43.95	8.02	60.49%	4.57
43.95-51.86	7.70	65.88%	4.38
51.86-61.20	7.23	70.94%	4.12
61.20-72.22	6.95	75.81%	3.96
72.22-85.22	6.28	80.21%	3.57
85.22-100.57	4.98	83.69%	2.83
100.57-118.67	3.97	86.47%	2.26
118.67-140.04	3.23	88.73%	1.84
140.04-165.26	3.51	91.19%	2.00
165.26-195.02	4.59	94.40%	2.61
195.02-212	8.00	100.00%	4.55
Total	142.82		81.30

Computed Statistics:

Weight Mean = 58.32 microns
D₁₀ = 4.33 microns
D₅₀ = 31.56 microns
D₉₀ = 140.04 microns

Volume of Sample: 1000 ml
Volume of Dilution: 1000 ml added
Comments: 1/0/00

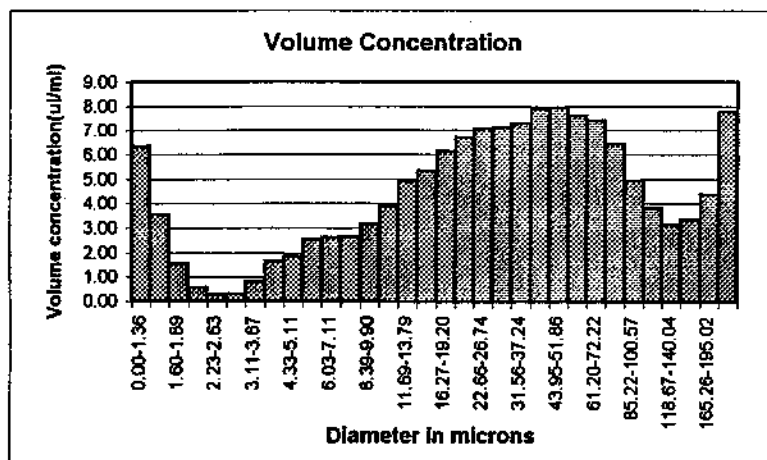
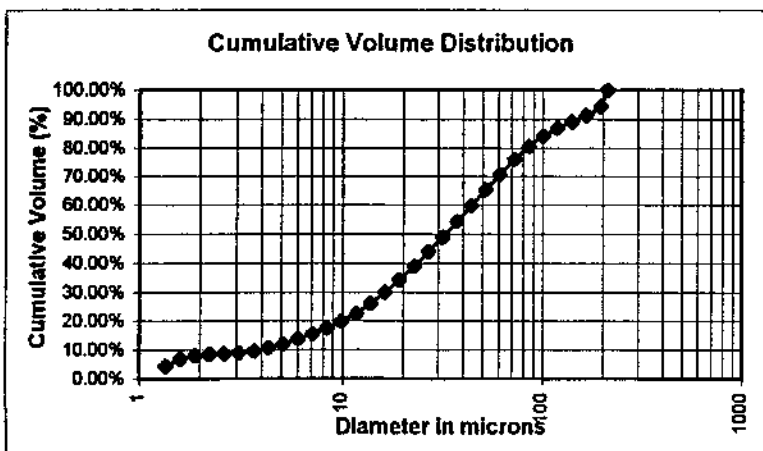
Size Range (microns)	Mass of TSS (mg)	% Mass of TSS
< 212	81.30	99.15%
212-425	0.50	0.61%
425-850	0.10	0.12%
>850	0.10	0.12%
Total	82.00	100.00%

Particle Size Distribution Analysis Results

Report Prepared for:
Ingrid Weltz
Taylor Associates
Tel: 206.633.4486

Analysis Performed by:
Lynel Rabago
University of Washington
Department of Civil Engineering
Contact: Dr. David Stensel
Tel: 206.543.9358

Project ID: SR405 Vortechs
Sample ID: VOR-010702-OUT
Date and Time Collected: 1/7/02 0.411805556
Date and Time of PSD Analysis: 1/8/02 0.420833333



Size Range (microns)	Volume Concentration (u/l)	Cumulative Volume (%)	Mass (mg)
0.00-1.36	6.33	4.49%	2.97
1.36-1.60	3.54	7.00%	1.66
1.60-1.89	1.57	8.11%	0.74
1.89-2.23	0.60	8.53%	0.28
2.23-2.63	0.28	8.73%	0.13
2.63-3.11	0.31	8.95%	0.15
3.11-3.67	0.83	9.54%	0.39
3.67-4.33	1.68	10.73%	0.79
4.33-5.11	1.86	12.05%	0.87
5.11-6.03	2.55	13.85%	1.20
6.03-7.11	2.62	15.71%	1.23
7.11-8.39	2.65	17.59%	1.24
8.39-9.90	3.15	19.82%	1.48
9.90-11.69	3.89	22.58%	1.83
11.69-13.79	4.91	26.06%	2.30
13.79-16.27	5.33	29.83%	2.50
16.27-19.20	6.13	34.17%	2.87
19.20-22.66	6.73	38.94%	3.15
22.66-26.74	7.07	43.95%	3.32
26.74-31.56	7.12	48.99%	3.34
31.56-37.24	7.31	54.17%	3.43
37.24-43.95	7.89	59.76%	3.70
43.95-51.86	7.95	65.39%	3.73
51.86-61.20	7.61	70.78%	3.57
61.20-72.22	7.40	76.02%	3.47
72.22-85.22	6.43	80.57%	3.01
85.22-100.57	4.94	84.07%	2.32
100.57-118.67	3.83	86.79%	1.80
118.67-140.04	3.14	89.01%	1.47
140.04-165.26	3.35	91.38%	1.57
165.26-195.02	4.39	94.49%	2.06
195.02-212	7.77	100.00%	3.64
Total	141.19		66.20

Computed Statistics:

Weight Mean = 57.95 microns
D₁₀ = 3.67 microns
D₅₀ = 31.56 microns
D₉₀ = 140.04 microns

Volume of Sample: 950 ml
Volume of Dilution: 550 ml added
Comments: 1/0/00

Size Range (microns)	Mass of TSS (mg)	% Mass of TSS
< 212	66.20	97.21%
212-425	0.60	0.88%
425-850	0.10	0.15%
>850	1.20	1.76%
Total	68.10	100.00%

SITE VISIT SHEET (SR 405 VortechsTM Monitoring)

Date/Time 11/6/02 08:00 Field Staff JP Weather cloudy
Pre-Storm Visit or - Post-Storm Visit (circle one)

INLET

Check Current Readings / Download:

ISCO Time? reset (Y/N)? 6:17
 Time downloaded -
 level 0.026

OUTLET

Check Current Readings / Download:

ISCO Time? reset (Y/N)? 08:19
 Level (ft.) 0.183
 Velocity (f/s) 0.10x
 Flow (cfs) 0
 Total Flow (cf) 9333
 Sig/Spec str. 0/0
 Time downloaded -

Pre - Storm Visit

INLET

Battery (V) 12.5
 Clean bottle (Y/N)? Y
 Pump tubing ok (Y/N)? Replaced? Y
 Sampler tubing ok (Y/N)? Y
 Strainer ok? -
 Ext. desiccant ok (Y/N)? Changed? Y
 Int. desiccant ok (Y/N)? Changed? Y
 Measure Dn level? Ok? -
 Sample Volume (ml) 200-1
 Inspect Rain Gage ok
 Sampler enabled? (Y/N) Y

OUTLET

Battery (V) 12.2
 Clean bottle (Y/N)? Y
 Pump tubing ok (Y/N)? Replaced? Y
 Sampler tubing ok (Y/N)? Y
 Strainer ok? -
 Ext. desiccant ok (Y/N)? Changed? Y
 Int. desiccant ok (Y/N)? Changed? Y
 Measure Dn level? Ok? -
 Enable level (ft) 20.55
 Pacing (cf) / Sample Volume (ml) 600
 Sampler enabled? (Y/N) Y

no delay to start

Post - Storm Visit

INLET

Equipment Ran Completely? _____
 Sampler Enabled (date/time)? _____
 Composite Began (date/time)? _____
 Number of subsamples taken? _____
 Any subsample collection errors? _____
 Last Sample (date/time)? _____
 Est. Sample Volume Collected (ml) _____
 Sample ID? _____

OUTLET

Equipment Ran Completely? _____
 Sampler Enabled (date/time)? _____
 Composite Began (date/time)? _____
 Number of subsamples taken? _____
 Any subsample collection errors? _____
 Last Sample (date/time)? _____
 Est. Sample Volume Collected (ml) _____
 Sample ID? _____

Y/N	Value	Storm Validation Criteria
	hrs. (if known)	Was there an antecedent dry period of at least six hours?
	in.	Was total rainfall greater than or equal to 0.25"?
	hrs.	Was runoff duration greater than one hour?

Y/N	Value	Flow-weighted Composite Sample Validation Criteria
	% (approx.)	Was greater than 75% of the total volume of the storm sampled?
	# subsample	Were at least 10 sub-samples collected at the inlet?
	# subsample	Were at least 10 sub-samples collected at the outlet?

Was a field duplicate collected? If so, Sample ID. _____ Field blank collected? If so, Sample ID. _____

NOTES (including any problems with equipment or maintenance activities performed):

SITE VISIT SHEET (SR 405 Vortechs™ Monitoring)

Date/Time 1/7/02 12:45 Field Staff JP Weather light rain

Pre-Storm Visit - or - Post-Storm Visit (circle one)

INLET

Check Current Readings / Download:

ISCO Time? reset (Y/N)? 12:55 N
 Time downloaded 12:45
 level 0.121

OUTLET

Check Current Readings / Download:

ISCO Time? reset (Y/N)? 12:55: N
 Level (ft.) 0.367
 Velocity (ft/s) 0.40
 Flow (cfs) 0.197
 Total Flow (cf) 38401
 Sig/Spec str. 3/96
 Time downloaded 12:50

Pre - Storm Visit

INLET

Battery (V) _____
 Clean bottle (Y/N)? _____
 Pump tubing ok (Y/N)? Replaced? _____
 Sampler tubing ok (Y/N)? _____
 Strainer ok? _____
 Ext. desiccant ok (Y/N)? Changed? _____
 Int. desiccant ok (Y/N)? Changed? _____
 Measure Dn level? Ok? _____
 Sample Volume (ml) _____
 Inspect Rain Gage _____
 Sampler enabled? (Y/N) _____

OUTLET

Battery (V) _____
 Clean bottle (Y/N)? _____
 Pump tubing ok (Y/N)? Replaced? _____
 Sampler tubing ok (Y/N)? _____
 Strainer ok? _____
 Ext. desiccant ok (Y/N)? Changed? _____
 Int. desiccant ok (Y/N)? Changed? _____
 Measure Dn level? Ok? _____
 Enable level (ft) _____
 Pacing (cf) / Sample Volume (ml) _____
 Sampler enabled? (Y/N) _____

Post - Storm Visit

INLET

Equipment Ran Completely? Y
 Sampler Enabled (date/time)? 14:49 1/6
 Composite Began (date/time)? 14:49 1/6
 Number of subsamples taken? 50/50
 Any subsample collection errors? N
 Last Sample (date/time)? 09:52 1/7
 Est. Sample Volume Collected (ml) 11 L
 Sample ID? VOR-010702-IN

OUTLET

Equipment Ran Completely? Y
 Sampler Enabled (date/time)? 14:50 1/6
 Composite Began (date/time)? 14:50 1/6
 Number of subsamples taken? 50/50
 Any subsample collection errors? N
 Last Sample (date/time)? 09:53 1/7
 Est. Sample Volume Collected (ml) 9.5 L
 Sample ID? VOR-010702-OUT

Y/N	Value	Storm Validation Criteria
Y	> 5 hrs. (if known)	Was there an antecedent dry period of at least six hours?
Y	0.99 in.	Was total rainfall greater than or equal to 0.25"?
Y	124 hrs.	Was runoff duration greater than one hour?

Rain
 $0.86/0.99 = 86\%$

Y/N	Value	Flow-weighted Composite Sample Validation Criteria
Y	85% % (approx.)	Was greater than 75% of the total volume of the storm sampled?
Y	50 # subsample	Were at least 10 sub-samples collected at the inlet?
Y	50 # subsample	Were at least 10 sub-samples collected at the outlet?

Flow
 $31021 / 38851 = 85\%$

Was a field duplicate collected? If so, Sample ID. _____ Field blank collected? If so, Sample ID. _____

NOTES (including any problems with equipment or maintenance activities performed):

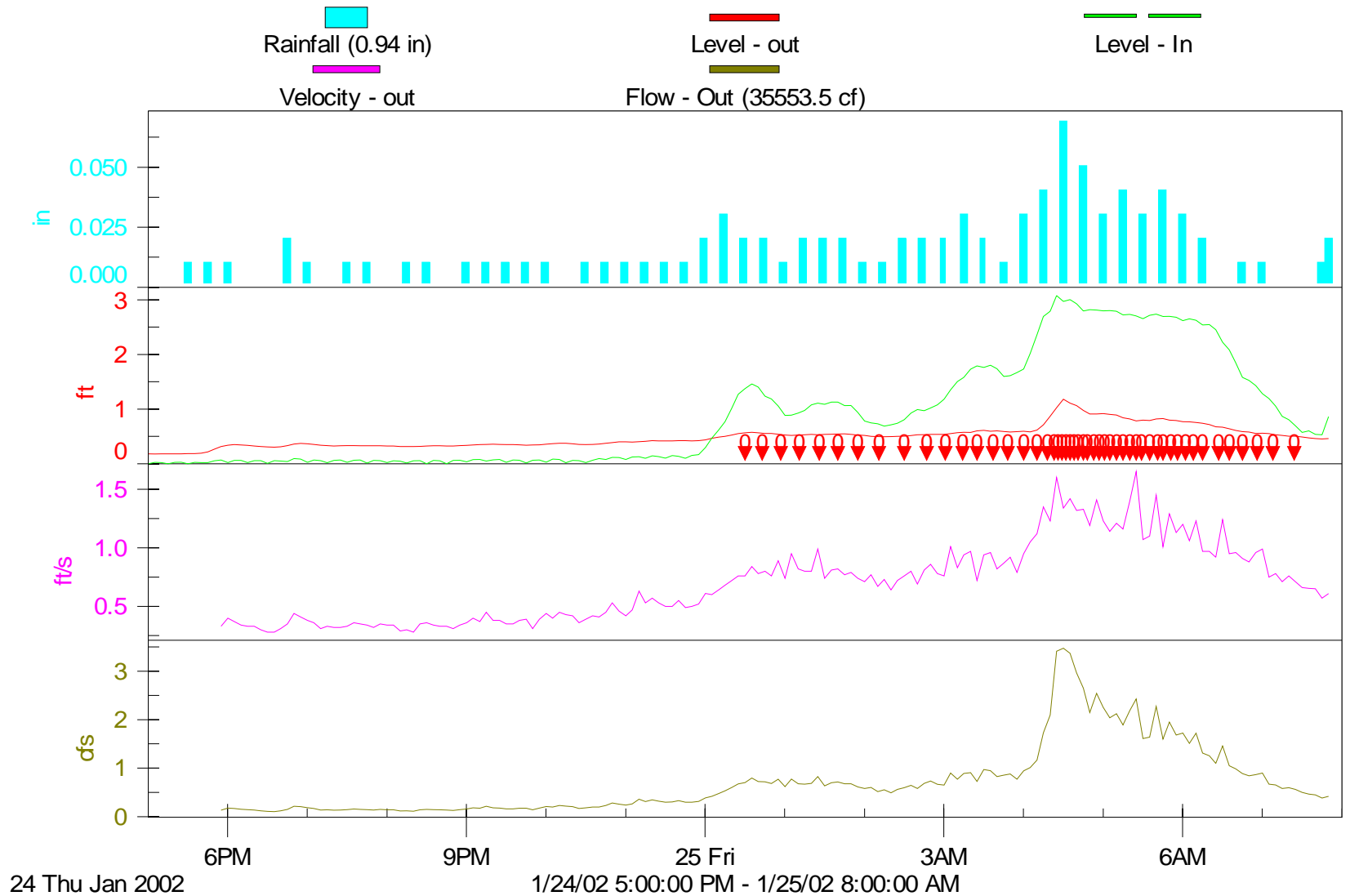
Did not wait 6 hrs after last rain fall. Left battery to continue to record rain.

STORM EVENT

NUMBER 9

SR 405 Vortechincs

Storm #9, 24-25 January 2002



CASE NARRATIVE for B2A0506

Client: Taylor Associates
Project Manager: James Packman
Project Name: SR405 Vortechs
Project Number: Not Provided

1.0 DESCRIPTION OF CASE

Four water samples were submitted for the analysis of Total and Dissolved Metals by EPA 200.8 and conventional chemistry parameters by APHA/EPA Methods.

2.0 COMMENTS ON SAMPLE RECEIPT

The samples were received and logged in on 25th January 2002 at a temperature of 9.6 Degrees Celsius.

3.0 Preparation and Analysis

Total and Dissolved Metals by EPA 200.8

All criteria for acceptable QC measurements were met with the following exceptions:


- An aliquot of unpreserved sample was filtered and preserved in the lab in accordance with EPA 3005 for the analysis of dissolved metals.

Conventional Chemistry Parameters by APHA/EPA Methods

All criteria for acceptable QC measurements were met with the following exceptions:

- An aliquot of unpreserved sample was preserved with Sulfuric Acid in the lab for the analysis of Phosphorous by EPA 365.5.
- The percent recovery for the Phosphorous Matrix Spike in analytical batch 2B01025 was outside the established control limits of 57-137%; since all other QC recoveries were within control no further action was deemed necessary.

"I certify that this data package is in compliance with the Contract both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Director or his designee, as verified by the following signature."



Amar Gill
Project Manager
North Creek Analytical



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Spokane East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
509.924.9200 fax 509.924.9290
Portland 9405 SW Nimbus Avenue, Beaverton, OR 97008-7132
503.906.9200 fax 503.906.9210
Bend 20332 Empire Avenue, Suite F-1, Bend, OR 97701-5711
541.383.9310 fax 541.382.7588

Taylor Associates Inc
7104 Greenwood Ave N
Seattle WA/USA, 98103

Project: SR405 Vortechs
Project Number: Not Provided
Project Manager: James Packman

Reported:
02/06/02 11:22

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
VOR-012502-IN	B2A0506-01	Water	01/25/02 07:23	01/25/02 09:45
VOR-012502-IN-DUP	B2A0506-02	Water	01/25/02 07:23	01/25/02 09:45
VOR-012502-OUT	B2A0506-03	Water	01/25/02 07:24	01/25/02 09:45
VOR-012502-OUT-DUP	B2A0506-04	Water	01/25/02 07:24	01/25/02 09:45

North Creek Analytical - Bothell

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Amar Gill, Project Manager

North Creek Analytical, Inc.
Environmental Laboratory Network

Page 1 of 10

Taylor Associates Inc
7104 Greenwood Ave N
Seattle WA/USA, 98103

Project: SR405 Vortechs
Project Number: Not Provided
Project Manager: James Packman

Reported:
02/06/02 11:22

Total Metals by EPA 200 Series Methods
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
VOR-012502-IN (B2A0506-01) Water Sampled: 01/25/02 07:23 Received: 01/25/02 09:45									
Zinc	0.0972	0.0100	mg/l	1	2A28015	01/28/02	01/29/02	EPA 200.8	
VOR-012502-IN-DUP (B2A0506-02) Water Sampled: 01/25/02 07:23 Received: 01/25/02 09:45									
Zinc	0.0800	0.0100	mg/l	1	2A28015	01/28/02	01/29/02	EPA 200.8	
VOR-012502-OUT (B2A0506-03) Water Sampled: 01/25/02 07:24 Received: 01/25/02 09:45									
Zinc	0.0766	0.0100	mg/l	1	2A28015	01/28/02	01/29/02	EPA 200.8	
VOR-012502-OUT-DUP (B2A0506-04) Water Sampled: 01/25/02 07:24 Received: 01/25/02 09:45									
Zinc	0.0790	0.0100	mg/l	1	2A28015	01/28/02	01/29/02	EPA 200.8	

North Creek Analytical - Bothell

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Amar Gill, Project Manager

Taylor Associates Inc
 7104 Greenwood Ave N
 Seattle WA/USA, 98103

Project: SR405 Vortechs
 Project Number: Not Provided
 Project Manager: James Packman

Reported:
 02/06/02 11:22

Dissolved Metals by EPA 200 Series Methods
North Creek Analytical - Bothell

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
VOR-012502-IN (B2A0506-01) Water Sampled: 01/25/02 07:23 Received: 01/25/02 09:45									
Zinc	0.0156	0.0100	mg/l	1	2B01013	02/01/02	02/01/02	EPA 200.8	
VOR-012502-IN-DUP (B2A0506-02) Water Sampled: 01/25/02 07:23 Received: 01/25/02 09:45									
Zinc	0.0176	0.0100	mg/l	1	2B01013	02/01/02	02/01/02	EPA 200.8	
VOR-012502-OUT (B2A0506-03) Water Sampled: 01/25/02 07:24 Received: 01/25/02 09:45									
Zinc	0.0144	0.0100	mg/l	1	2B01013	02/01/02	02/01/02	EPA 200.8	
VOR-012502-OUT-DUP (B2A0506-04) Water Sampled: 01/25/02 07:24 Received: 01/25/02 09:45									
Zinc	0.0136	0.0100	mg/l	1	2B01013	02/01/02	02/01/02	EPA 200.8	

North Creek Analytical - Bothell

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 custody document. This analytical report must be reproduced in its entirety.



Amar Gill, Project Manager

North Creek Analytical, Inc.
 Environmental Laboratory Network

Page 3 of 10

Taylor Associates Inc
 7104 Greenwood Ave N
 Seattle WA/USA, 98103

Project: SR405 Vortechs
 Project Number: Not Provided
 Project Manager: James Packman

Reported:
 02/06/02 11:22

Conventional Chemistry Parameters by APHA/EPA Methods

North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
VOR-012502-IN (B2A0506-01) Water Sampled: 01/25/02 07:23 Received: 01/25/02 09:45									
Hardness	31.1	1.00 mg eq. CaCO ₃ /L		1	2B01022	02/01/02	02/06/02	SM 2340B	
Orthophosphate-phosphorus	0.0138	0.00200	mg/l	"	2A26004	01/25/02	01/25/02	EPA 365.2	
Phosphorus	0.0698	0.00500	"	"	2B01025	01/31/02	01/31/02	"	
pH	6.89		pH Units	"	2A28017	01/25/02	01/25/02	EPA 150.1	
Total Suspended Solids	190	4.0	mg/l	"	2A30015	01/28/02	01/30/02	EPA 160.2	
Turbidity	53.9	1.00	NTU	"	2A28016	01/25/02	01/25/02	EPA 180.1	
VOR-012502-IN-DUP (B2A0506-02) Water Sampled: 01/25/02 07:23 Received: 01/25/02 09:45									
Hardness	26.6	1.00 mg eq. CaCO ₃ /L		1	2B01022	02/01/02	02/06/02	SM 2340B	
Orthophosphate-phosphorus	0.0130	0.00200	mg/l	"	2A26004	01/25/02	01/25/02	EPA 365.2	
Phosphorus	0.200	0.00500	"	"	2B01025	01/31/02	01/31/02	"	
pH	6.95		pH Units	"	2A28017	01/25/02	01/25/02	EPA 150.1	
Total Suspended Solids	130	4.0	mg/l	"	2A30015	01/28/02	01/30/02	EPA 160.2	
Turbidity	58.0	1.00	NTU	"	2A28016	01/25/02	01/25/02	EPA 180.1	
VOR-012502-OUT (B2A0506-03) Water Sampled: 01/25/02 07:24 Received: 01/25/02 09:45									
Hardness	26.0	1.00 mg eq. CaCO ₃ /L		1	2B01022	02/01/02	02/06/02	SM 2340B	
Orthophosphate-phosphorus	0.0112	0.00200	mg/l	"	2A26004	01/25/02	01/25/02	EPA 365.2	
Phosphorus	0.180	0.00500	"	"	2B01025	01/31/02	01/31/02	"	
pH	6.99		pH Units	"	2A28017	01/25/02	01/25/02	EPA 150.1	
Total Suspended Solids	150	4.0	mg/l	"	2A30015	01/28/02	01/30/02	EPA 160.2	
Turbidity	56.0	1.00	NTU	"	2A28016	01/25/02	01/25/02	EPA 180.1	
VOR-012502-OUT-DUP (B2A0506-04) Water Sampled: 01/25/02 07:24 Received: 01/25/02 09:45									
Hardness	26.6	1.00 mg eq. CaCO ₃ /L		1	2B01022	02/01/02	02/06/02	SM 2340B	
Orthophosphate-phosphorus	0.0117	0.00200	mg/l	"	2A26004	01/25/02	01/25/02	EPA 365.2	
Phosphorus	0.191	0.00500	"	"	2B01025	01/31/02	01/31/02	"	
pH	6.95		pH Units	"	2A28017	01/25/02	01/25/02	EPA 150.1	
Total Suspended Solids	140	4.0	mg/l	"	2A30015	01/28/02	01/30/02	EPA 160.2	
Turbidity	45.8	1.00	NTU	"	2A28016	01/25/02	01/25/02	EPA 180.1	

North Creek Analytical - Bothell

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



Amar Gill, Project Manager

North Creek Analytical, Inc.
 Environmental Laboratory Network

Page 4 of 10

Taylor Associates Inc
 7104 Greenwood Ave N
 Seattle WA/USA, 98103

Project: SR405 Vortechs
 Project Number: Not Provided
 Project Manager: James Packman

Reported:
 02/06/02 11:22

Total Metals by EPA 200 Series Methods - Quality Control
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC Limits	RPD Limit	Notes
Batch 2A28015: Prepared 01/28/02 Using EPA 200 Series								
Blank (2A28015-BLK1)								
Zinc	ND	0.0100	mg/l					
LCS (2A28015-BS1)								
Zinc	0.208	0.0100	mg/l	0.200		104 85-115		
LCS Dup (2A28015-BSD1)								
Zinc	0.190	0.0100	mg/l	0.200		95.0 85-115	9.05 15	
Duplicate (2A28015-DUP1)								
					Source: B2A0453-03			
Zinc	ND	0.0100	mg/l		ND		2.48 20	
Matrix Spike (2A28015-MS1)								
					Source: B2A0453-03			
Zinc	0.189	0.0100	mg/l	0.200	ND	93.1 75-125		

North Creek Analytical - Bothell

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Amar Gill, Project Manager

North Creek Analytical, Inc.
 Environmental Laboratory Network

Page 5 of 10

Taylor Associates Inc
 7104 Greenwood Ave N
 Seattle WA/USA, 98103

Project: SR405 Vortechs
 Project Number: Not Provided
 Project Manager: James Packman

Reported:
 02/06/02 11:22

Dissolved Metals by EPA 200 Series Methods - Quality Control
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2B01013: Prepared 02/01/02 Using EPA 3005A										
Blank (2B01013-BLK1)										
Zinc	ND	0.0100	mg/l							
LCS (2B01013-BS1)										
Zinc	0.200	0.0100	mg/l	0.200		100	85-115			
LCS Dup (2B01013-BSD1)										
Zinc	0.199	0.0100	mg/l	0.200		99.5	85-115	0.501	15	
Duplicate (2B01013-DUP1) Source: B2A0453-03										
Zinc	ND	0.0100	mg/l		ND			9.51	20	
Matrix Spike (2B01013-MS1) Source: B2A0453-03										
Zinc	0.210	0.0100	mg/l	0.200	ND	101	75-125			
ix Spike Dup (2B01013-MSD1) Source: B2A0453-03										
Zinc	0.206	0.0100	mg/l	0.200	ND	99.0	75-125	1.92	20	

North Creek Analytical - Bothell

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Amar Gill, Project Manager

North Creek Analytical, Inc.
 Environmental Laboratory Network

Page 6 of 10

Taylor Associates Inc
 7104 Greenwood Ave N
 Seattle WA/USA, 98103

Project: SR405 Vortechs
 Project Number: Not Provided
 Project Manager: James Packman

Reported:
 02/06/02 11:22

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 2A26004: Prepared 01/25/02 Using General Preparation

Blank (2A26004-BLK1)

Orthophosphate-phosphorus	ND	0.00200	mg/l							
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LCS (2A26004-BS1)

Orthophosphate-phosphorus	0.146	0.00200	mg/l	0.150		97.3	90-110			
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LCS Dup (2A26004-BSD1)

Orthophosphate-phosphorus	0.148	0.00200	mg/l	0.150		98.7	90-110	1.36	20	
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Matrix Spike (2A26004-MS1)

Source: B2A0506-01

Orthophosphate-phosphorus	0.0593	0.00200	mg/l	0.0500	0.0138	91.0	80-120			
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Matrix Spike Dup (2A26004-MSD1)

Source: B2A0506-01

Orthophosphate-phosphorus	0.0622	0.00200	mg/l	0.0500	0.0138	96.8	80-120	4.77	25	
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h 2A28016: Prepared 01/25/02 Using General Preparation

Blank (2A28016-BLK1)

Turbidity	ND	1.00	NTU							
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LCS (2A28016-BS1)

Turbidity	18.8	1.00	NTU	20.0		94.0	90-110			
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LCS Dup (2A28016-BSD1)

Turbidity	18.9	1.00	NTU	20.0		94.5	90-110	0.531	20	
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Duplicate (2A28016-DUP1)

Source: B2A0506-01

Turbidity	48.3	1.00	NTU		53.9			11.0	20	
-----------	------	------	-----	--	------	--	--	------	----	--

North Creek Analytical - Bothell

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Amar Gill, Project Manager

Taylor Associates Inc
 7104 Greenwood Ave N
 Seattle WA/USA, 98103

Project: SR405 Vortechs
 Project Number: Not Provided
 Project Manager: James Packman

Reported:
 02/06/02 11:22

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2A28017: Prepared 01/25/02 Using General Preparation										
Duplicate (2A28017-DUP1)					Source: B2A0506-01					
pH	6.93		pH Units		6.89			0.579	10	
Batch 2A30015: Prepared 01/28/02 Using General Preparation										
Blank (2A30015-BLK1)										
Total Suspended Solids	ND	4.0	mg/l							
Duplicate (2A30015-DUP1)					Source: B2A0506-01					
Total Suspended Solids	180	4.0	mg/l		190			5.4	19	
Batch 2B01022: Prepared 02/01/02 Using EPA 3010A										
Blank (2B01022-BLK1)										
Hardness	ND	1.00mg eq. CaCO3/L								
(2B01022-BS1)										
Hardness	63.0	1.00mg eq. CaCO3/L					70-130			
LCS Dup (2B01022-BSD1)										
Hardness	62.6	1.00mg eq. CaCO3/L					70-130	0.637	20	
Matrix Spike (2B01022-MS1)					Source: B2A0506-01					
Hardness	96.9	1.00mg eq. CaCO3/L			31.1		75-125			
Matrix Spike Dup (2B01022-MSD1)					Source: B2A0506-01					
Hardness	97.3	1.00mg eq. CaCO3/L			31.1		75-125	0.412	20	

North Creek Analytical - Bothell

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Amar Gill, Project Manager



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425.420.9200 fax 425.420.9210
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509.924.9200 fax 509.924.9290
Portland 9405 SW Nimbus Avenue, Beaverton, OR 97008-7132
503.906.9200 fax 503.906.9210
Bend 20332 Empire Avenue, Suite F-1, Bend, OR 97701-5711
541.383.9310 fax 541.382.7588

Taylor Associates Inc
7104 Greenwood Ave N
Seattle WA/USA, 98103

Project: SR405 Vortechs
Project Number: Not Provided
Project Manager: James Packman

Reported:
02/06/02 11:22

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2B01025: Prepared 01/31/02 Using General Preparation										
Blank (2B01025-BLK1)										
Phosphorus	ND	0.00500	mg/l							
LCS (2B01025-BS1)										
Phosphorus	0.152	0.00500	mg/l	0.150		101	90-120			
LCS Dup (2B01025-BSD1)										
Phosphorus	0.149	0.00500	mg/l	0.150		99.3	90-120	1.99	20	
Matrix Spike (2B01025-MS1)										
					Source: B2A0506-01					
Phosphorus	0.113	0.00500	mg/l	0.0250	0.0698	173	57-137			Q-01
Matrix Spike Dup (2B01025-MSD1)										
					Source: B2A0506-01					
Phosphorus	0.104	0.00500	mg/l	0.0250	0.0698	137	57-137	8.29	25	

North Creek Analytical - Bothell

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Amar Gill, Project Manager

North Creek Analytical, Inc.
Environmental Laboratory Network

Taylor Associates Inc
7104 Greenwood Ave N
Seattle WA/USA, 98103

Project: SR405 Vortechs
Project Number: Not Provided
Project Manager: James Packman

Reported:
02/06/02 11:22

Notes and Definitions

Q-01 The spike recovery for this QC sample is outside of established control limits. Review of associated batch QC indicates the recovery for this analyte does not represent an out-of-control condition for the batch.

DET Analyte DETECTED

ND Analyte NOT DETECTED at or above the reporting limit

NR Not Reported

dry Sample results reported on a dry weight basis

RPD Relative Percent Difference

North Creek Analytical - Bothell

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Amar Gill, Project Manager

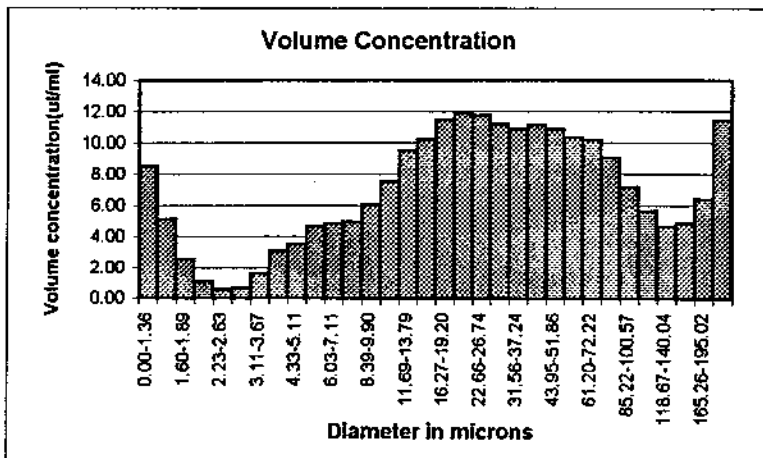
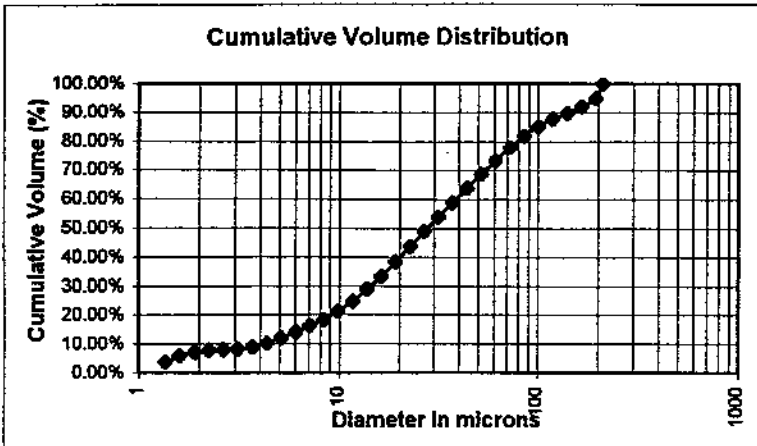
Appendix B- field sheets.xls, CoC - SR405

Particle Size Distribution Analysis Results

Report Prepared for:
Ingrid Weltz
Taylor Associates
Tel: 206.633.4486

Analysis Performed by:
Lynel Rabago
University of Washington
Department of Civil Engineering
Contact: Dr. David Stensel
Tel: 206.543.9358

Project ID: SR 405 Vortechs
Sample ID: VOR-012502-IN-PSD
Date and Time Collected: 1/25/02 7:23
Date and Time of PSD Analysis: 1/26/02 14:04



Size Range (microns)	Volume Concentration (ufl/l)	Cumulative Volume (%)	Mass (mg)
0.00-1.36	8.53	3.82%	6.30
1.36-1.60	5.13	6.12%	3.79
1.60-1.89	2.51	7.24%	1.85
1.89-2.23	1.07	7.72%	0.79
2.23-2.63	0.56	7.97%	0.41
2.63-3.11	0.64	8.26%	0.48
3.11-3.67	1.59	8.97%	1.18
3.67-4.33	3.12	10.37%	2.30
4.33-5.11	3.51	11.94%	2.59
5.11-6.03	4.67	14.03%	3.45
6.03-7.11	4.82	16.19%	3.56
7.11-8.39	4.96	18.41%	3.66
8.39-9.90	6.03	21.11%	4.45
9.90-11.69	7.52	24.48%	5.55
11.69-13.79	9.49	28.73%	7.01
13.79-16.27	10.21	33.30%	7.54
16.27-19.20	11.48	38.44%	8.47
19.20-22.66	11.91	43.77%	8.79
22.66-26.74	11.79	49.05%	8.70
26.74-31.56	11.18	54.06%	8.28
31.56-37.24	10.88	58.93%	8.03
37.24-43.95	11.17	63.93%	8.25
43.95-51.86	10.85	68.79%	8.01
51.86-61.20	10.31	73.40%	7.61
61.20-72.22	10.16	77.95%	7.50
72.22-85.22	9.06	82.01%	6.69
85.22-100.57	7.17	85.22%	5.30
100.57-118.67	5.66	87.76%	4.18
118.67-140.04	4.65	89.84%	3.43
140.04-165.26	4.87	92.02%	3.59
165.26-195.02	6.40	94.89%	4.73
195.02-212	11.42	100.00%	8.43
Total	223.31		164.90

Computed Statistics:

Weight Mean = 54.17 microns
D₁₀ = 3.67 microns
D₅₀ = 26.74 microns
D₉₀ = 140.04 microns

Volume of Sample: 975 ml
Volume of Dilution: 1525 ml added
Comments: 1/0/00

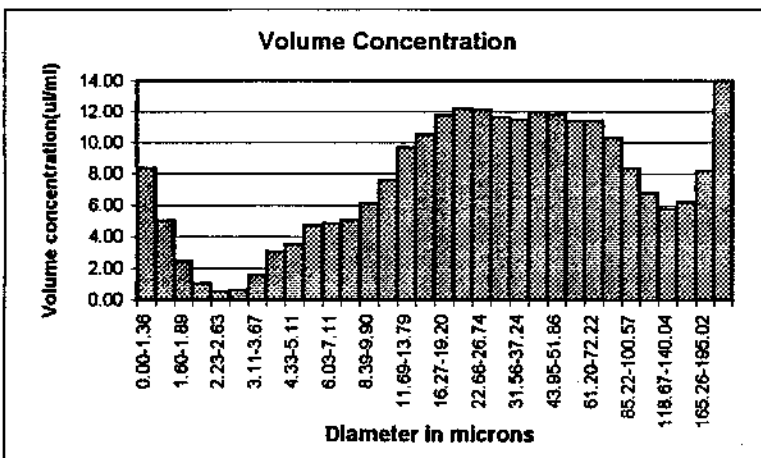
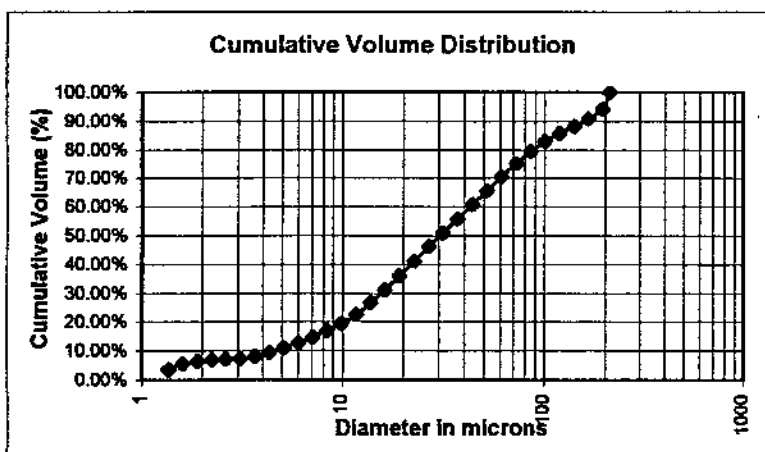
Size Range (microns)	Mass of TSS (mg)	% Mass TSS
< 212	164.90	89.43%
212-425	7.50	4.07%
425-850	3.80	2.06%
>850	8.20	4.45%
Total	184.40	100.00%

Particle Size Distribution Analysis Results

Report Prepared for:
Ingrid Weltz
Taylor Associates
Tel: 206.633.4486

Analysis Performed by:
Lynel Rabago
University of Washington
Department of Civil Engineering
Contact: Dr. David Stensel
Tel: 206.543.9358

Project ID: SR 405 Vortechs
Sample ID: VOR-012502-OUT-PSD
Date and Time Collected: 1/25/02 7:24
Date and Time of PSD Analysis: 1/26/02 14:41



Size Range (microns)	Volume Concentration (ul/l)	Cumulative Volume (%)	Mass (mg)
0.00-1.36	8.33	3.47%	5.07
1.36-1.60	5.00	5.55%	3.04
1.60-1.89	2.43	6.56%	1.48
1.89-2.23	1.03	6.99%	0.63
2.23-2.63	0.54	7.22%	0.33
2.63-3.11	0.62	7.48%	0.38
3.11-3.67	1.55	8.12%	0.95
3.67-4.33	3.07	9.40%	1.87
4.33-5.11	3.50	10.86%	2.13
5.11-6.03	4.70	12.82%	2.86
6.03-7.11	4.85	14.84%	2.95
7.11-8.39	5.04	16.94%	3.07
8.39-9.90	6.11	19.48%	3.72
9.90-11.69	7.61	22.66%	4.63
11.69-13.79	9.68	26.69%	5.89
13.79-16.27	10.53	31.07%	6.41
16.27-19.20	11.75	35.97%	7.15
19.20-22.66	12.20	41.05%	7.43
22.66-26.74	12.15	46.12%	7.40
26.74-31.56	11.66	50.97%	7.10
31.56-37.24	11.46	55.75%	6.98
37.24-43.95	11.99	60.75%	7.30
43.95-51.86	11.82	65.67%	7.19
51.86-61.20	11.41	70.42%	6.95
61.20-72.22	11.40	75.17%	6.94
72.22-85.22	10.32	79.47%	6.28
85.22-100.57	8.34	82.95%	5.07
100.57-118.67	6.79	85.78%	4.13
118.67-140.04	5.78	88.19%	3.52
140.04-165.26	6.21	90.77%	3.78
165.26-195.02	8.16	94.17%	4.97
195.02-212	13.98	100.00%	8.51
Total	240.02		146.10

Computed Statistics:

Weight Mean = 58.66 microns
D₁₀ = 4.33 microns
D₅₀ = 26.74 microns
D₉₀ = 140.04 microns

Volume of Sample: 975 ml
Volume of Dilution: 1525 ml added
Comments: 1/0/00

Size Range (microns)	Mass of TSS (mg)	% Mass TSS
< 212	146.10	96.56%
212-425	2.50	1.65%
425-850	2.00	1.32%
>850	0.70	0.46%
Total	151.30	100.00%

SITE VISIT SHEET (SR 405 Vortechs™ Monitoring)

Date/Time 11/22/02 12:00 Field Staff JP Weather cloudy, light occ. rain

Pre-Storm Visit - or - Post-Storm Visit (circle one)

INLET

Check Current Readings / Download:

ISCO Time? reset (Y/N)? 12:51 1/23
 Time downloaded -
 level (ft.) 0.027
0.026

OUTLET

Check Current Readings / Download:

ISCO Time? reset (Y/N)? 12:52 1/23
 Level (ft.) 0.163
 Velocity (f/s) 0.14*
 Flow (cfs) 0*
 Total Flow (cf) 98605
 Sig/Spec str. 0/0
 Time downloaded -

Pre - Storm Visit

INLET

Battery (V) 12.5
 Clean bottle (Y/N)? Y
 Pump tubing ok (Y/N)? Replaced? Y
 Sampler tubing ok (Y/N)? Y
 Strainer ok? -
 Ext. desiccant ok (Y/N)? Changed? Y
 Int. desiccant ok (Y/N)? Changed? Y
 Measure Dn level? Ok? -
 Sample Volume (ml) 200ml
 Inspect Rain Gage Y
 Sampler enabled? (Y/N) Y

OUTLET

Battery (V) 12.5
 Clean bottle (Y/N)? Y
 Pump tubing ok (Y/N)? Replaced? Y-replaced & reset
 Sampler tubing ok (Y/N)? Y
 Strainer ok? -
 Ext. desiccant ok (Y/N)? Changed? N/Y
 Int. desiccant ok (Y/N)? Changed? Y
 Measure Dn level? Ok? -
 Enable level (ft) 0.55
 Pacing (cf) / Sample Volume (ml) 600 / 200ml
 Sampler enabled? (Y/N) Y
offset = 0.145

Post - Storm Visit

INLET

Equipment Ran Completely? -
 Sampler Enabled (date/time)? -
 Composite Began (date/time)? -
 Number of subsamples taken? -
 Any subsample collection errors? -
 Last Sample (date/time)? -
 Est. Sample Volume Collected (ml) -
 Sample ID? -

OUTLET

Equipment Ran Completely? -
 Sampler Enabled (date/time)? -
 Composite Began (date/time)? -
 Number of subsamples taken? -
 Any subsample collection errors? -
 Last Sample (date/time)? -
 Est. Sample Volume Collected (ml) -
 Sample ID? -

Y/N	Value	Storm Validation Criteria
	hrs. (if known)	Was there an antecedent dry period of at least six hours?
	in.	Was total rainfall greater than or equal to 0.25"?
	hrs.	Was runoff duration greater than one hour?

Y/N	Value	Flow-weighted Composite Sample Validation Criteria
	% (approx.)	Was greater than 75% of the total volume of the storm sampled?
	# subsample	Were at least 10 sub-samples collected at the inlet?
	# subsample	Were at least 10 sub-samples collected at the outlet?

Was a field duplicate collected? If so, Sample ID. _____ Field blank collected? If so, Sample ID. _____

NOTES (including any problems with equipment or maintenance activities performed): _____

SITE VISIT SHEET (SR 405 Vortechs™ Monitoring)

Date/Time 1/25/02 07:30 Field Staff JP Weather mit + lt. rain

Pre-Storm Visit - or - Post-Storm Visit (circle one)

INLET

Check Current Readings / Download:

ISCO Time? reset (Y/N)? 7:43/1
Time downloaded 7:43
level (ft.) 0.440

OUTLET

Check Current Readings / Download:

ISCO Time? reset (Y/N)? 7:48
Level (ft.) 0.459
Velocity (ft/s) 0.62
Flow (cfs) 0.289
Total Flow (cf) 36379
Sig/Spec str. 29/88
Time downloaded 7:25

Pre - Storm Visit

INLET

Battery (V) _____
Clean bottle (Y/N)? _____
Pump tubing ok (Y/N)? Replaced? _____
Sampler tubing ok (Y/N)? _____
Strainer ok? _____
Ext. desiccant ok (Y/N)? Changed? _____
Int. desiccant ok (Y/N)? Changed? _____
Measure Dn level? Ok? _____
Sample Volume (ml) _____
Inspect Rain Gage _____
Sampler enabled? (Y/N) _____

OUTLET

Battery (V) _____
Clean bottle (Y/N)? _____
Pump tubing ok (Y/N)? Replaced? _____
Sampler tubing ok (Y/N)? _____
Strainer ok? _____
Ext. desiccant ok (Y/N)? Changed? _____
Int. desiccant ok (Y/N)? Changed? _____
Measure Dn level? Ok? _____
Enable level (ft) _____
Pacing (cf) / Sample Volume (ml) _____
Sampler enabled? (Y/N) _____

Post - Storm Visit

INLET

Equipment Ran Completely? Y
Sampler Enabled (date/time)? 1/25 00:28
Composite Began (date/time)? "
Number of subsamples taken? 50/100
Any subsample collection errors? N
Last Sample (date/time)? 1/25 7:23
Est. Sample Volume Collected (ml) 10.2 gal
Sample ID? SR-012502-5N

OUTLET

Equipment Ran Completely? Y
Sampler Enabled (date/time)? 1/25 07:30
Composite Began (date/time)? "
Number of subsamples taken? 50/100
Any subsample collection errors? N
Last Sample (date/time)? 1/25 7:23
Est. Sample Volume Collected (ml) 10.2 gal
Sample ID? SR-012502-5N

Y/N	Value	Storm Validation Criteria
<u>Y</u>	<u>8</u> hrs. (if known)	Was there an antecedent dry period of at least six hours?
<u>Y</u>	<u>0.91</u> in.	Was total rainfall greater than or equal to 0.25"?
<u>Y</u>	<u>1.13</u> hrs.	Was runoff duration greater than one hour?

Y/N	Value	Flow-weighted Composite Sample Validation Criteria
<u>Y</u>	<u>75%</u> % (approx.)	Was greater than 75% of the total volume of the storm sampled?
<u>Y</u>	<u>12</u> # subsample	Were at least 10 sub-samples collected at the inlet?
<u>Y</u>	<u>10</u> # subsample	Were at least 10 sub-samples collected at the outlet?

Was a field duplicate collected? If so, Sample ID. _____ Field blank collected? If so, Sample ID. _____

NOTES (including any problems with equipment or maintenance activities performed):

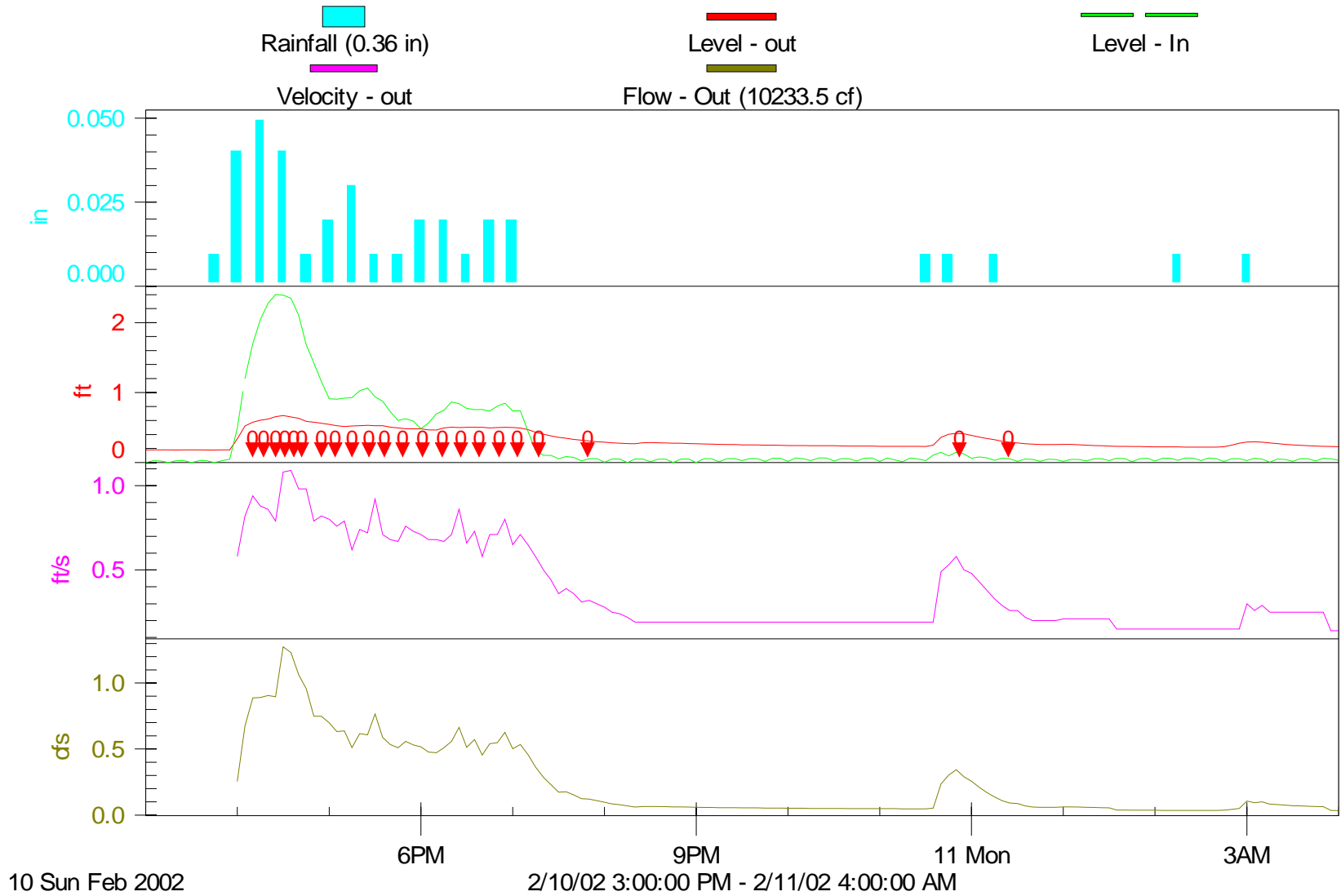
- Inlet seems a over comp. check calibration
- submitted field duplicate

STORM EVENT

NUMBER 10

SR 405 Vortechincs

Storm#10, 10-11 February 2002



CASE NARRATIVE for B2B0232

Client: Taylor Associates
Project Manager: James Packman
Project Name: SR405 Vortechs
Project Number: Not Provided

1.0 DESCRIPTION OF CASE

Two water samples were submitted for the analysis of Total and Dissolved Metals by EPA 200.8 and conventional chemistry parameters by APHA/EPA Methods.

2.0 COMMENTS ON SAMPLE RECEIPT

The samples were received and logged in on 11th February 2002 at a temperature of 7.5 Degrees Celsius.

3.0 Preparation and Analysis

Total and Dissolved Metals by EPA 200.8

All criteria for acceptable QC measurements were met with the following exceptions:


- The RPD for the Total Zinc duplicate in analytical batch 2B19005 was outside the established control limit of 20%, since all other QC criteria in the analytical batch were met no further action was deemed necessary.
- An aliquot of unpreserved sample was filtered and preserved in the lab in accordance with EPA 3005 for the analysis of dissolved metals.

Conventional Chemistry Parameters by APHA/EPA Methods

All criteria for acceptable QC measurements were met with the following exceptions:

- An aliquot of unpreserved sample was preserved with Sulfuric Acid in the lab for the analysis of Phosphorous by EPA 365.5.

"I certify that this data package is in compliance with the Contract both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Director or his designee, as verified by the following signature."



Amar Gill
Project Manager
North Creek Analytical



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Taylor Associates Inc
7104 Greenwood Ave N
Seattle WA/USA, 98103

Project: SR405 Vortechs
Project Number: Not Provided
Project Manager: James Packman

Reported:
02/25/02 15:41

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
VDR-021102-IN	B2B0232-01	Water	02/11/02 00:23	02/11/02 13:40
VDR-021102-OUT	B2B0232-02	Water	02/11/02 00:24	02/11/02 13:40

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Project: SR405 Vortechs
Project Number: Not Provided
Project Manager: James Packman

Reported:
02/25/02 15:41

Total Metals by EPA 200 Series Methods
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Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
VDR-021102-IN (B2B0232-01) Water Sampled: 02/11/02 00:23 Received: 02/11/02 13:40									
Zinc	0.111	0.0100	mg/l	1	2B19005	02/19/02	02/19/02	EPA 200.8	
VDR-021102-OUT (B2B0232-02) Water Sampled: 02/11/02 00:24 Received: 02/11/02 13:40									
Zinc	0.122	0.0100	mg/l	1	2B19005	02/19/02	02/19/02	EPA 200.8	

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Project Manager: James Packman

Reported:
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Dissolved Metals by EPA 200 Series Methods
North Creek Analytical - Bothell

Analyte	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
	Result	Limit							
VDR-021102-IN (B2B0232-01) Water Sampled: 02/11/02 00:23 Received: 02/11/02 13:40 Q-30									
Zinc	0.0183	0.0100	mg/l	1	2B14028	02/14/02	02/15/02	EPA 200.8	
VDR-021102-OUT (B2B0232-02) Water Sampled: 02/11/02 00:24 Received: 02/11/02 13:40 Q-30									
Zinc	0.0210	0.0100	mg/l	1	2B14028	02/14/02	02/15/02	EPA 200.8	

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Project: SR405 Vortechs
 Project Number: Not Provided
 Project Manager: James Packman

Reported:
 02/25/02 15:41

Conventional Chemistry Parameters by APHA/EPA Methods
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
VDR-021102-IN (B2B0232-01) Water Sampled: 02/11/02 00:23 Received: 02/11/02 13:40									
Hardness	27.2	1.00 mg eq. CaCO ₃ /L		1	2B15009	02/15/02	02/18/02	SM 2340B	
Orthophosphate-phosphorus	0.0171	0.00200	mg/l	"	2B12044	02/12/02	02/12/02	EPA 365.2	
Phosphorus	0.214	0.00500	"	"	2B19029	02/18/02	02/19/02	"	
pH	7.06		pH Units	"	2B12001	02/11/02	02/11/02	EPA 150.1	
Total Suspended Solids	110	4.0	mg/l	"	2B18024	02/12/02	02/18/02	EPA 160.2	
Turbidity	39.4	1.00	NTU	"	2B12003	02/11/02	02/11/02	EPA 180.1	
VDR-021102-OUT (B2B0232-02) Water Sampled: 02/11/02 00:24 Received: 02/11/02 13:40									
Hardness	29.1	1.00 mg eq. CaCO ₃ /L		1	2B15009	02/15/02	02/18/02	SM 2340B	
Orthophosphate-phosphorus	0.00773	0.00200	mg/l	"	2B12044	02/12/02	02/12/02	EPA 365.2	
Phosphorus	0.257	0.00500	"	"	2B19029	02/18/02	02/19/02	"	
pH	7.02		pH Units	"	2B12001	02/11/02	02/11/02	EPA 150.1	
Total Suspended Solids	130	4.0	mg/l	"	2B18024	02/12/02	02/18/02	EPA 160.2	
-bidity	48.0	1.00	NTU	"	2B12003	02/11/02	02/11/02	EPA 180.1	

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Project: SR405 Vortechs
Project Number: Not Provided
Project Manager: James Packman

Reported:
02/25/02 15:41

Total Metals by EPA 200 Series Methods - Quality Control
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC Limits	RPD	RPD Limit	Notes
Batch 2B19005: Prepared 02/19/02 Using EPA 200 Series									
Blank (2B19005-BLK1)									
Zinc	ND	0.0100	mg/l						
LCS (2B19005-BS1)									
Zinc	0.199	0.0100	mg/l	0.200		99.5 85-115			
LCS Dup (2B19005-BSD1)									
Zinc	0.197	0.0100	mg/l	0.200		98.5 85-115	1.01	15	
Duplicate (2B19005-DUP1) Source: B2B0276-01									
Zinc	0.0352	0.0100	mg/l		0.0470		28.7	20	Q-01
Matrix Spike (2B19005-MS1) Source: B2B0276-01									
Zinc	0.227	0.0100	mg/l	0.200	0.0470	90.0 75-125			

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 Project Manager: James Packman

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Dissolved Metals by EPA 200 Series Methods - Quality Control
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2B14028: Prepared 02/14/02 Using EPA 3005A										
Blank (2B14028-BLK1)										
Zinc	ND	0.0100	mg/l							
LCS (2B14028-BS1)										
Zinc	0.209	0.0100	mg/l	0.200		104	85-115			
LCS Dup (2B14028-BSD1)										
Zinc	0.208	0.0100	mg/l	0.200		104	85-115	0.480	15	
Duplicate (2B14028-DUP1)										
					Source: B2B0232-01					
Zinc	0.0181	0.0100	mg/l		0.0183			1.10	20	
Matrix Spike (2B14028-MS1)										
					Source: B2B0194-01					
Zinc	0.213	0.0100	mg/l	0.200	ND	104	75-125			

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 Project Manager: James Packman

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Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC Limits	RPD	RPD Limit	Notes
Batch 2B12001: Prepared 02/11/02 Using General Preparation									
Duplicate (2B12001-DUP1)					Source: B2B0232-02				
pH	7.01		pH Units		7.02		0.143	10	
Batch 2B12003: Prepared 02/11/02 Using General Preparation									
Blank (2B12003-BLK1)									
Turbidity	ND	1.00	NTU						
LCS (2B12003-BS1)									
Turbidity	19.8	1.00	NTU	20.0		99.0	90-110		
LCS Dup (2B12003-BSD1)									
Turbidity	19.8	1.00	NTU	20.0		99.0	90-110	0.00	20
Duplicate (2B12003-DUP1)					Source: B2B0231-01				
idity	12.6	1.00	NTU		12.2		3.23	20	
Batch 2B12044: Prepared 02/12/02 Using General Preparation									
Blank (2B12044-BLK1)									
Orthophosphate-phosphorus	ND	0.00200	mg/l						
LCS (2B12044-BS1)									
Orthophosphate-phosphorus	0.0917	0.00200	mg/l	0.0999		91.8	90-110		
LCS Dup (2B12044-BSD1)									
Orthophosphate-phosphorus	0.0939	0.00200	mg/l	0.0999		94.0	90-110	2.37	20

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Project: SR405 Vortechs
 Project Number: Not Provided
 Project Manager: James Packman

Reported:
 02/25/02 15:41

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
---------	--------	--------------------	-------	----------------	------------------	------	----------------	-----	--------------	-------

Batch 2B12044: Prepared 02/12/02 Using General Preparation

Matrix Spike (2B12044-MS1)

Source: B2B0232-01

Orthophosphate-phosphorus	0.109	0.00200	mg/l	0.0999	0.0171	92.0	80-120			
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Matrix Spike Dup (2B12044-MSD1)

Source: B2B0232-01

Orthophosphate-phosphorus	0.108	0.00200	mg/l	0.0999	0.0171	91.0	80-120	0.922	25	
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Batch 2B15009: Prepared 02/15/02 Using EPA 3020A

Blank (2B15009-BLK1)

Hardness	ND	1.00mg eq. CaCO3/L								
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LCS (2B15009-BS1)

Hardness	60.0	1.00mg eq. CaCO3/L					70-130			
----------	------	--------------------	--	--	--	--	--------	--	--	--

LCS Dup (2B15009-BSD1)

Hardness	61.0	1.00mg eq. CaCO3/L					70-130	1.65	20	
----------	------	--------------------	--	--	--	--	--------	------	----	--

Matrix Spike (2B15009-MS1)

Source: B2B0232-01

Hardness	89.6	1.00mg eq. CaCO3/L			27.2		75-125			
----------	------	--------------------	--	--	------	--	--------	--	--	--

Matrix Spike Dup (2B15009-MSD1)

Source: B2B0232-01

Hardness	90.9	1.00mg eq. CaCO3/L			27.2		75-125	1.44	20	
----------	------	--------------------	--	--	------	--	--------	------	----	--

Batch 2B18024: Prepared 02/12/02 Using General Preparation

Blank (2B18024-BLK1)

Total Suspended Solids	ND	4.0	mg/l							
------------------------	----	-----	------	--	--	--	--	--	--	--

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Project: SR405 Vortechs
Project Number: Not Provided
Project Manager: James Packman

Reported:
02/25/02 15:41

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC Limits	RPD	RPD Limit	Notes
Batch 2B18024: Prepared 02/12/02 Using General Preparation									
Duplicate (2B18024-DUP1)					Source: B2B0232-01				
Total Suspended Solids	120	4.0	mg/l		110		8.7	19	
Batch 2B19029: Prepared 02/18/02 Using General Preparation									
Blank (2B19029-BLK1)									
Phosphorus	ND	0.00500	mg/l						
LCS (2B19029-BS1)									
Phosphorus	0.149	0.00500	mg/l	0.150		99.3	90-120		
LCS Dup (2B19029-BSD1)									
Phosphorus	0.149	0.00500	mg/l	0.150		99.3	90-120	0.00	20
Matrix Spike (2B19029-MS1)					Source: B2B0240-01				
Phosphorus	0.126	0.00500	mg/l	0.0499	0.0759	100	57-137		
Matrix Spike Dup (2B19029-MSD1)					Source: B2B0240-01				
Phosphorus	0.125	0.00500	mg/l	0.0499	0.0759	98.4	57-137	0.797	25

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Project Number: Not Provided
Project Manager: James Packman

Reported:
02/25/02 15:41

Notes and Definitions

- Q-01 The spike recovery for this QC sample is outside of established control limits. Review of associated batch QC indicates the recovery for this analyte does not represent an out-of-control condition for the batch.
- Q-30 This sample was laboratory filtered since it was not field filtered as is required by the methodology.
- DET Analyte DETECTED
- ND Analyte NOT DETECTED at or above the reporting limit
- NR Not Reported
- dry Sample results reported on a dry weight basis
- RPD Relative Percent Difference

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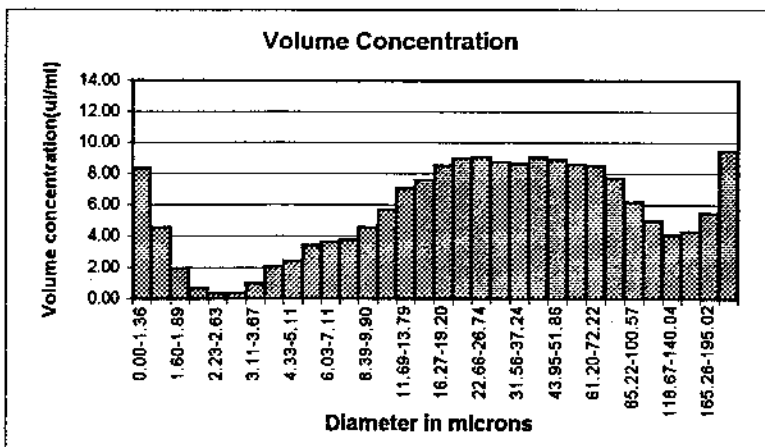
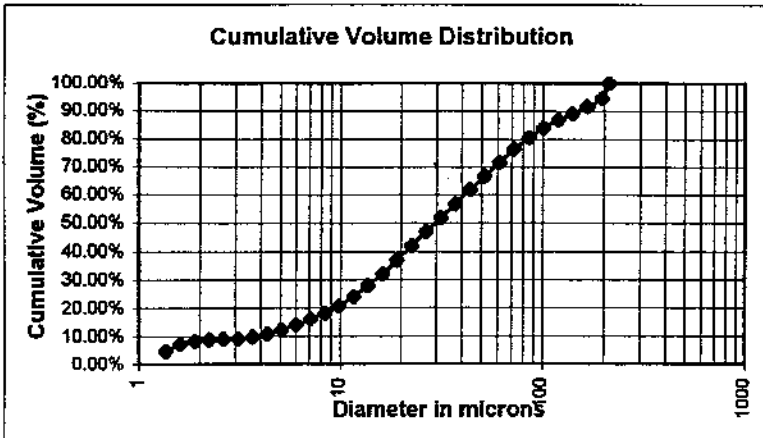
Amar Gill, Project Manager

Particle Size Distribution Analysis Results

Report Prepared for:
Ingrid Weltz
Taylor Associates
Tel: 206.633.4486

Analysis Performed by:
Lynel Rabago
University of Washington
Department of Civil Engineering
Contact: Dr. David Stensel
Tel: 206.543.9358

Project ID: SR405 Vortechs
Sample ID: VOR-021102-IN-PSD
Date and Time Collected: 2/11/02 0:23
Date and Time of PSD Analysis: 2/12/02 13:48



Size Range (microns)	Volume Concentration (ul / l)	Cumulative Volume (%)	Mass (mg)
0.00-1.36	8.32	4.66%	5.23
1.36-1.60	4.58	7.22%	2.87
1.60-1.89	1.96	8.32%	1.23
1.89-2.23	0.72	8.72%	0.45
2.23-2.63	0.33	8.91%	0.21
2.63-3.11	0.37	9.11%	0.23
3.11-3.67	0.99	9.67%	0.62
3.67-4.33	2.09	10.84%	1.31
4.33-5.11	2.40	12.19%	1.51
5.11-6.03	3.42	14.10%	2.15
6.03-7.11	3.61	16.12%	2.27
7.11-8.39	3.75	18.22%	2.36
8.39-9.90	4.54	20.77%	2.85
9.90-11.69	5.65	23.94%	3.55
11.69-13.79	7.09	27.91%	4.46
13.79-16.27	7.59	32.17%	4.77
16.27-19.20	8.50	36.93%	5.34
19.20-22.66	8.98	41.97%	5.64
22.66-26.74	9.03	47.03%	5.67
26.74-31.56	8.76	51.94%	5.51
31.56-37.24	8.63	56.77%	5.42
37.24-43.95	9.02	61.83%	5.67
43.95-51.86	8.89	66.82%	5.59
51.86-61.20	8.59	71.63%	5.40
61.20-72.22	8.49	76.39%	5.34
72.22-85.22	7.71	80.71%	4.85
85.22-100.57	6.18	84.17%	3.88
100.57-118.67	4.95	86.95%	3.11
118.67-140.04	4.08	89.24%	2.57
140.04-165.26	4.29	91.64%	2.69
165.26-195.02	5.46	94.70%	3.43
195.02-212	9.45	100.00%	5.94
Total	178.39		112.10

Computed Statistics:

Weight Mean = 56.33 microns
D₁₀ = 3.67 microns
D₅₀ = 26.74 microns
D₉₀ = 140.04 microns

Volume of Sample: 1000 ml
Volume of Dilution: 1000 ml added
Comments: 1/0/00

Size Range (microns)	Mass of TSS (mg)	% Mass TSS
< 212	112.10	90.99%
212-425	7.50	6.09%
425-850	2.20	1.79%
> 850	1.40	1.14%
Total	123.20	100.00%

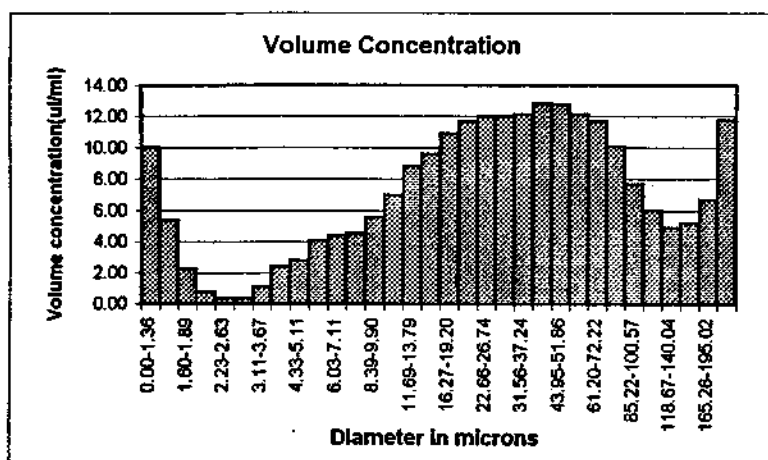
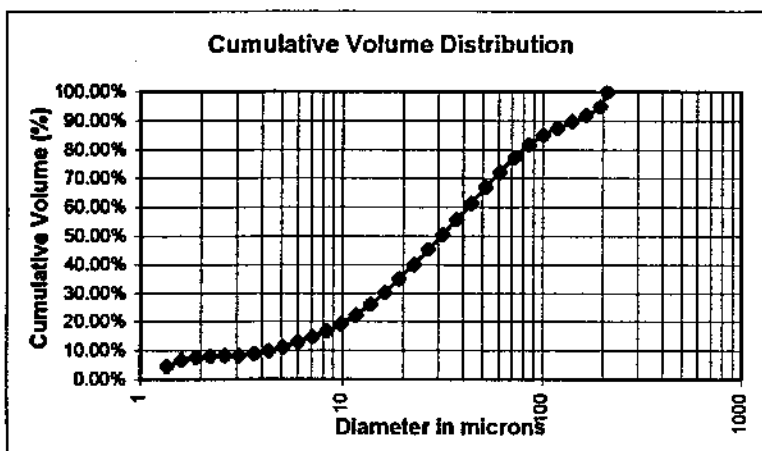
Particle Size Distribution Analysis Results

Report Prepared for:
Ingrid Weltz
Taylor Associates
Tel: 206.633.4486

Analysis Performed by:
Lynel Rabago
University of Washington
Department of Civil Engineering
Contact: Dr. David Stensel
Tel: 206.543.9358

Project ID: SR405 Vortechs
Sample ID: VOR-021102-OUT-PSD
Date and Time Collected: 2/11/02
Date and Time of PSD Analysis: 2/12/02

0:24
14:50



Size Range (microns)	Volume Concentration (ul/l)	Cumulative Volume (%)	Mass (mg)
0.00-1.36	10.03	4.36%	5.53
1.36-1.60	5.38	6.70%	2.97
1.60-1.89	2.25	7.67%	1.24
1.89-2.23	0.79	8.02%	0.44
2.23-2.63	0.35	8.17%	0.19
2.63-3.11	0.39	8.34%	0.22
3.11-3.67	1.10	8.82%	0.61
3.67-4.33	2.41	9.86%	1.33
4.33-5.11	2.82	11.09%	1.56
5.11-6.03	4.08	12.86%	2.25
6.03-7.11	4.41	14.78%	2.43
7.11-8.39	4.60	16.78%	2.54
8.39-9.90	5.59	19.21%	3.08
9.90-11.69	6.96	22.23%	3.84
11.69-13.79	8.85	26.08%	4.88
13.79-16.27	9.56	30.23%	5.28
16.27-19.20	10.90	34.97%	6.01
19.20-22.66	11.68	40.04%	6.45
22.66-26.74	12.04	45.27%	6.64
26.74-31.56	12.01	50.49%	6.63
31.56-37.24	12.14	55.76%	6.70
37.24-43.95	12.86	61.35%	7.10
43.95-51.86	12.76	66.89%	7.04
51.86-61.20	12.15	72.17%	6.70
61.20-72.22	11.69	77.25%	6.45
72.22-85.22	10.09	81.63%	5.57
85.22-100.57	7.68	84.97%	4.24
100.57-118.67	6.01	87.58%	3.32
118.67-140.04	4.92	89.72%	2.72
140.04-165.26	5.20	91.98%	2.87
165.26-195.02	6.67	94.88%	3.68
195.02-212	11.78	100.00%	6.50
Total	230.17		127.00

Computed Statistics:

Weight Mean = 56.12 microns
D₁₀ = 4.33 microns
D₅₀ = 26.74 microns
D₉₀ = 140.04 microns

Volume of Sample: 1025 ml
Volume of Dilution: 975 ml added
Comments: 1/0/00

Size Range (microns)	Mass of TSS (mg)	% Mass TSS
< 212	127.00	96.87%
212-425	2.40	1.83%
425-850	1.30	0.99%
>850	0.40	0.31%
Total	131.10	100.00%

SITE VISIT SHEET (SR 405 Vortechs™ Monitoring)

Date/Time 2/8/02 12:15 Field Staff JP Weather overcast & cool

Pre-Storm Visit - or - Post-Storm Visit (circle one)

INLET

Check Current Readings / Download:

ISCO Time? reset (Y/N)? 12:30 N
 Time downloaded -
 level 0.062

OUTLET

Check Current Readings / Download:

ISCO Time? reset (Y/N)? 12:31 N
 Level (ft.) 0.227
 Velocity (f/s) 0.73 *
 Flow (cfs) 0
 Total Flow (cf) 3643.0
 Sig/Spec str. 0/0
 Time downloaded -

Pre - Storm Visit

INLET

Battery (V) 12.5
 Clean bottle (Y/N)? Y
 Pump tubing ok (Y/N)? Replaced? Y/N
 Sampler tubing ok (Y/N)? Y
 Strainer ok? -
 Ext. desiccant ok (Y/N)? Changed? Y/N
 Int. desiccant ok (Y/N)? Changed? Y/N
 Measure Dn level? Ok? -
 Sample Volume (ml) 200
 Inspect Rain Gage Y
 Sampler enabled? (Y/N) Y

Delay to start 06:01 on Sun 2/10
Sat 2/9

OUTLET

Battery (V) 12.5
 Clean bottle (Y/N)? Y
 Pump tubing ok (Y/N)? Replaced? Y/N
 Sampler tubing ok (Y/N)? Y
 Strainer ok? -
 Ext. desiccant ok (Y/N)? Changed? Y/N
 Int. desiccant ok (Y/N)? Changed? Y/N
 Measure Dn level? Ok? -
 Enable level (ft) > 0.55
 Pacing (cf) / Sample Volume (ml) 400/200
 Sampler enabled? (Y/N) Y

0.145
offsc

Delay to start 06:00 on Sun 2/10
Sat 2/9

Post - Storm Visit

INLET

Equipment Ran Completely? -
 Sampler Enabled (date/time)? -
 Composite Began (date/time)? -
 Number of subsamples taken? -
 Any subsample collection errors? -
 Last Sample (date/time)? -
 Est. Sample Volume Collected (ml) -
 Sample ID? -

OUTLET

Equipment Ran Completely? -
 Sampler Enabled (date/time)? -
 Composite Began (date/time)? -
 Number of subsamples taken? -
 Any subsample collection errors? -
 Last Sample (date/time)? -
 Est. Sample Volume Collected (ml) -
 Sample ID? -

Y/N	Value	Storm Validation Criteria
	hrs. (if known)	Was there an antecedent dry period of at least six hours?
	in.	Was total rainfall greater than or equal to 0.25"?
	hrs.	Was runoff duration greater than one hour?

Y/N	Value	Flow-weighted Composite Sample Validation Criteria
	% (approx.)	Was greater than 75% of the total volume of the storm sampled?
	# subsample	Were at least 10 sub-samples collected at the inlet?
	# subsample	Were at least 10 sub-samples collected at the outlet?

Was a field duplicate collected? If so, Sample ID. _____ Field blank collected? If so, Sample ID. _____

NOTES (including any problems with equipment or maintenance activities performed):

SITE VISIT SHEET (SR 405 Vortechs™ Monitoring)

Date/Time 2/11/02 12:40 am Field Staff JP Weather CS

Pre-Storm Visit - or - Post-Storm Visit (circle one)

INLET

Check Current Readings / Download:

ISCO Time? reset (Y/N)? 12:18
Time downloaded 12:37
level (ft.) 0.026

OUTLET

Check Current Readings / Download:

ISCO Time? reset (Y/N)? 12:19/12
Level (ft.) 0.195
Velocity (f/s) 0.14
Flow (cfs) 0
Total Flow (cf) 8922
Sig/Spec str. 0/0
Time downloaded 12:30

Pre - Storm Visit

INLET

Battery (V) _____
Clean bottle (Y/N)? _____
Pump tubing ok (Y/N)? Replaced? _____
Sampler tubing ok (Y/N)? _____
Strainer ok? _____
Ext. desiccant ok (Y/N)? Changed? _____
Int. desiccant ok (Y/N)? Changed? _____
Measure Dn level? Ok? _____
Sample Volume (ml) _____
Inspect Rain Gage _____
Sampler enabled? (Y/N) _____

OUTLET

Battery (V) _____
Clean bottle (Y/N)? _____
Pump tubing ok (Y/N)? Replaced? _____
Sampler tubing ok (Y/N)? _____
Strainer ok? _____
Ext. desiccant ok (Y/N)? Changed? _____
Int. desiccant ok (Y/N)? Changed? _____
Measure Dn level? Ok? _____
Enable level (ft) _____
Pacing (cf) / Sample Volume (ml) _____
Sampler enabled? (Y/N) _____

Post - Storm Visit

INLET

Equipment Ran Completely? N
Sampler Enabled (date/time)? 2/10 16:08
Composite Began (date/time)? 2/10 16:08
Number of subsamples taken? 22/50
Any subsample collection errors? N
Last Sample (date/time)? 2/11 00:23
Est. Sample Volume Collected (ml) 1.3 gal
Sample ID? VOR-021102-IN

OUTLET

Equipment Ran Completely? N
Sampler Enabled (date/time)? 2/10 16:10
Composite Began (date/time)? 2/10 16:10
Number of subsamples taken? 22/50
Any subsample collection errors? N
Last Sample (date/time)? 2/11 00:24
Est. Sample Volume Collected (ml) 1.1 gal
Sample ID? VOR-021102-OUT

Y/N	Value	Storm Validation Criteria
Y	hrs. (if known)	Was there an antecedent dry period of at least six hours?
Y	<u>0.36</u> in.	Was total rainfall greater than or equal to 0.25"?
Y	<u>~12</u> hrs.	Was runoff duration greater than one hour?

Y/N	Value	Flow-weighted Composite Sample Validation Criteria
Y	<u>~96</u> % (approx.)	Was greater than 75% of the total volume of the storm sampled?
Y	<u>22</u> # subsample	Were at least 10 sub-samples collected at the inlet?
Y	<u>22</u> # subsample	Were at least 10 sub-samples collected at the outlet?

Rem $\frac{0.36}{0.36} = 92\%$
Flow $\frac{9607}{9987} = 96\%$

Was a field duplicate collected? If so, Sample ID. _____ Field blank collected? If so, Sample ID. _____

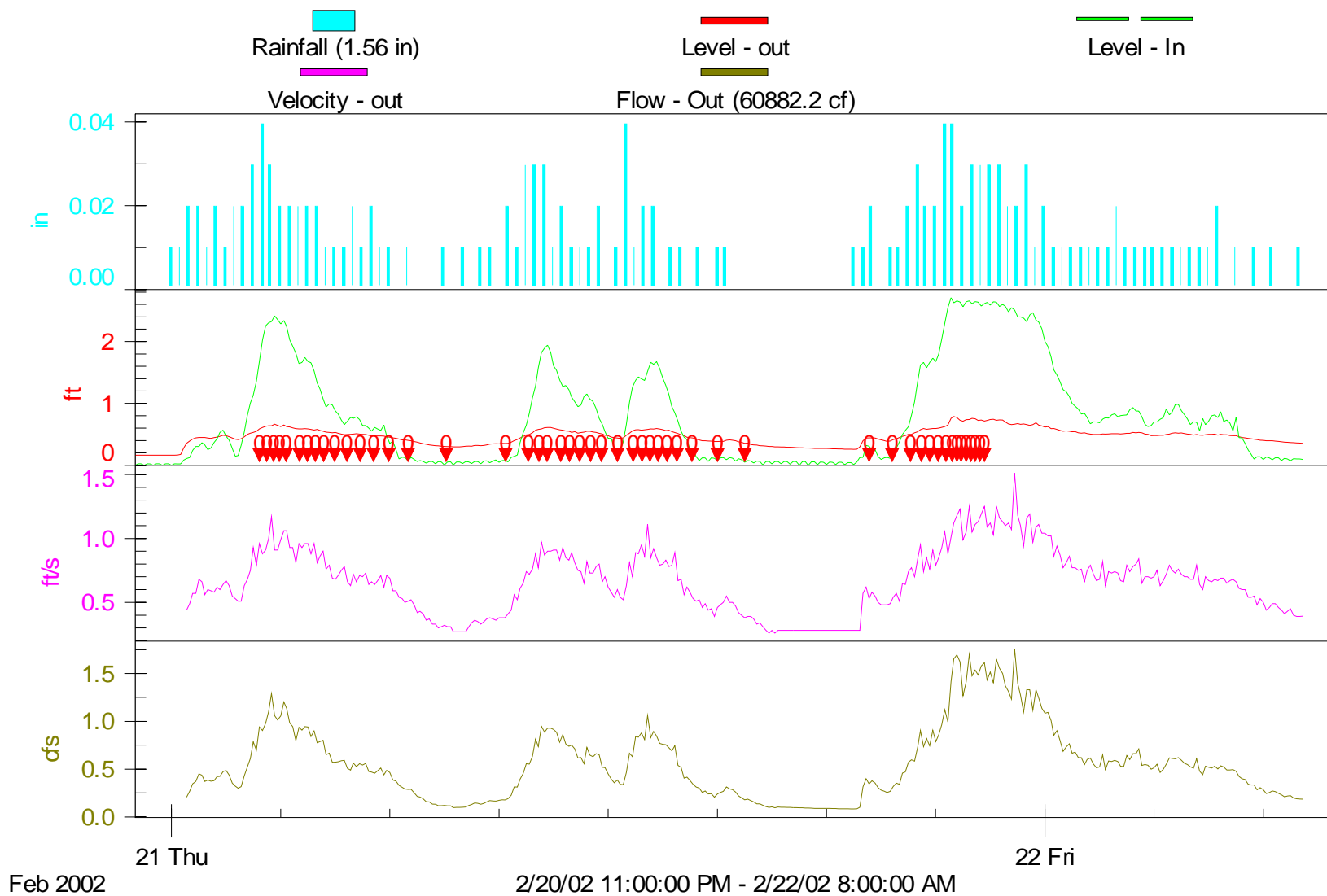
NOTES (including any problems with equipment or maintenance activities performed):

STORM EVENT

NUMBER 11

SR 405 Vortechnics

Storm#11, 20-22 February 2002



CASE NARRATIVE for B2B0484

Client: Taylor Associates
Project Manager: James Packman
Project Name: SR405 Vortechs
Project Number: Not Provided

1.0 DESCRIPTION OF CASE

Two water samples were submitted for the analysis of Total and Dissolved Metals by EPA 200.8 and conventional chemistry parameters by APHA/EPA Methods.

2.0 COMMENTS ON SAMPLE RECEIPT

The samples were received and logged in on 22nd February 2002 at a temperature of 8.3 Degrees Celsius.

3.0 Preparation and Analysis

Total and Dissolved Metals by EPA 200.8

All criteria for acceptable QC measurements were met with the following exceptions:

- An aliquot of unpreserved sample was filtered and preserved in the lab in accordance with EPA 3005 for the analysis of dissolved metals.

Conventional Chemistry Parameters by APHA/EPA Methods

All criteria for acceptable QC measurements were met with the following exceptions:

- An aliquot of unpreserved sample was preserved with Sulfuric Acid in the lab for the analysis of Phosphorous by EPA 365.5.
- The percent recovery for the Total Suspended Solids in analytical batch 2B22012 was above the established control limits of 30%. Since all other QC recoveries in the batch were within control limits this does not represent an out of control batch.

"I certify that this data package is in compliance with the Contract both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Director or his designee, as verified by the following signature."



Amar Gill

Project Manager
North Creek Analytical



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Taylor Associates Inc
7104 Greenwood Ave N
Seattle WA/USA, 98103

Project: SR405 Vortechs
Project Number: Not Provided
Project Manager: James Packman

Reported:
03/04/02 11:33

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
VDR-022102-IN	B2B0484-01	Water	02/21/02 22:19	02/22/02 08:25
VDR-022102-OUT	B2B0484-02	Water	02/21/02 22:20	02/22/02 08:25

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Project: SR405 Vortechs
Project Number: Not Provided
Project Manager: James Packman

Reported:
03/04/02 11:33

Total Metals by EPA 200 Series Methods
North Creek Analytical - Bothell

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
VDR-022102-IN (B2B0484-01) Water Sampled: 02/21/02 22:19 Received: 02/22/02 08:25									
Zinc	0.0617	0.0100	mg/l	1	2B22034	02/22/02	02/25/02	EPA 200.8	
VDR-022102-OUT (B2B0484-02) Water Sampled: 02/21/02 22:20 Received: 02/22/02 08:25									
Zinc	0.0766	0.0100	mg/l	1	2B22034	02/22/02	02/25/02	EPA 200.8	

North Creek Analytical - Bothell

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Taylor Associates Inc
7104 Greenwood Ave N
Seattle WA/USA, 98103

Project: SR405 Vortechs
Project Number: Not Provided
Project Manager: James Packman

Reported:
03/04/02 11:33

Dissolved Metals by EPA 200 Series Methods
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
VDR-022102-IN (B2B0484-01) Water Sampled: 02/21/02 22:19 Received: 02/22/02 08:25									
Zinc	0.0314	0.0100	mg/l	1	2B22019	02/22/02	02/22/02	EPA 200.8	
VDR-022102-OUT (B2B0484-02) Water Sampled: 02/21/02 22:20 Received: 02/22/02 08:25									
Zinc	0.0766	0.0100	mg/l	1	2B22019	02/22/02	02/22/02	EPA 200.8	

North Creek Analytical - Bothell

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Page 3 of 10

Taylor Associates Inc
 7104 Greenwood Ave N
 Seattle WA/USA, 98103

Project: SR405 Vortechs
 Project Number: Not Provided
 Project Manager: James Packman

Reported:
 03/04/02 11:33

Conventional Chemistry Parameters by APHA/EPA Methods
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
VDR-022102-IN (B2B0484-01) Water Sampled: 02/21/02 22:19 Received: 02/22/02 08:25									
Hardness	26.5	1.00	mg eq. CaCO ₃ /L	1	2B22023	02/22/02	03/01/02	SM 2340B	
Orthophosphate-phosphorus	0.00457	0.00200	mg/l	"	2B23006	02/23/02	02/23/02	EPA 365.2	
Phosphorus	0.0860	0.00500	"	"	2B25027	02/25/02	02/25/02	"	
pH	6.99		pH Units	"	2B22026	02/22/02	02/22/02	EPA 150.1	
Total Suspended Solids	53	4.0	mg/l	"	2B22012	"	"	EPA 160.2	
Turbidity	36.5	1.00	NTU	"	2B22021	"	"	EPA 180.1	
VDR-022102-OUT (B2B0484-02) Water Sampled: 02/21/02 22:20 Received: 02/22/02 08:25									
Hardness	26.6	1.00	mg eq. CaCO ₃ /L	1	2B22023	02/22/02	03/01/02	SM 2340B	
Orthophosphate-phosphorus	0.00271	0.00200	mg/l	"	2B23006	02/23/02	02/23/02	EPA 365.2	
Phosphorus	0.0942	0.00500	"	"	2B25027	02/25/02	02/25/02	"	
pH	6.98		pH Units	"	2B22026	02/22/02	02/22/02	EPA 150.1	
Total Suspended Solids	73	4.0	mg/l	"	2B22012	"	"	EPA 160.2	
Turbidity	38.2	1.00	NTU	"	2B22021	"	"	EPA 180.1	

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Taylor Associates Inc
7104 Greenwood Ave N
Seattle WA/USA, 98103

Project: SR405 Vortechs
Project Number: Not Provided
Project Manager: James Packman

Reported:
03/04/02 11:33

Total Metals by EPA 200 Series Methods - Quality Control
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC Limits	RPD	RPD Limit	Notes
Batch 2B22034: Prepared 02/22/02 Using EPA 200 Series									
Blank (2B22034-BLK1)									
Zinc	ND	0.0100	mg/l						
LCS (2B22034-BS1)									
Zinc	0.213	0.0100	mg/l	0.200		106	85-115		
LCS Dup (2B22034-BSD1)									
Zinc	0.210	0.0100	mg/l	0.200		105	85-115	1.42	15
Duplicate (2B22034-DUP1)									
					Source: B2B0409-01				
Zinc	ND	0.0100	mg/l		ND			7.59	20
Matrix Spike (2B22034-MS1)									
					Source: B2B0409-01				
Zinc	0.215	0.0100	mg/l	0.200	ND	104	75-125		

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Project: SR405 Vortechs
Project Number: Not Provided
Project Manager: James Packman

Reported:
03/04/02 11:33

Dissolved Metals by EPA 200 Series Methods - Quality Control
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC Limits	RPD	RPD Limit	Notes
Batch 2B22019: Prepared 02/22/02 Using EPA 3005A									
Blank (2B22019-BLK1)									
Zinc	ND	0.0100	mg/l						
LCS (2B22019-BS1)									
Zinc	0.209	0.0100	mg/l	0.200		104	85-115		
LCS Dup (2B22019-BSD1)									
Zinc	0.205	0.0100	mg/l	0.200		102	85-115	1.93	15
Duplicate (2B22019-DUP1)									
					Source: B2B0484-01				
Zinc	0.0320	0.0100	mg/l		0.0314			1.89	20
Matrix Spike (2B22019-MS1)									
					Source: B2B0484-01				
Zinc	0.232	0.0100	mg/l	0.200	0.0314	100	75-125		

North Creek Analytical - Bothell

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Amar Gill, Project Manager

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Taylor Associates Inc
7104 Greenwood Ave N
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Project: SR405 Vortechs
Project Number: Not Provided
Project Manager: James Packman

Reported:
03/04/02 11:33

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2B22012: Prepared 02/22/02 Using General Preparation										
Blank (2B22012-BLK1)										
Total Suspended Solids	ND	4.0	mg/l							
Duplicate (2B22012-DUP1) Source: B2B0417-01										
Total Suspended Solids	96	4.0	mg/l		130			30	19	Q-07
Batch 2B22021: Prepared 02/22/02 Using General Preparation										
Blank (2B22021-BLK1)										
Turbidity	ND	1.00	NTU							
LCS (2B22021-BS1)										
Turbidity	18.2	1.00	NTU	20.0		91.0	90-110			
LCS Dup (2B22021-BSD1)										
Turbidity	18.5	1.00	NTU	20.0		92.5	90-110	1.63	20	
Duplicate (2B22021-DUP1) Source: B2B0484-01										
Turbidity	39.0	1.00	NTU		36.5			6.62	20	
Batch 2B22023: Prepared 02/22/02 Using EPA 200 Series										
Blank (2B22023-BLK1)										
Hardness	ND	1.00mg eq. CaCO3/L								
LCS (2B22023-BS1)										
Hardness	61.6	1.00mg eq. CaCO3/L		66.2		93.1	70-130			

North Creek Analytical - Bothell

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Amar Gill, Project Manager

North Creek Analytical, Inc.
Environmental Laboratory Network

Taylor Associates Inc
 7104 Greenwood Ave N
 Seattle WA/USA, 98103

Project: SR405 Vortechs
 Project Number: Not Provided
 Project Manager: James Packman

Reported:
 03/04/02 11:33

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2B22023: Prepared 02/22/02 Using EPA 200 Series										
LCS Dup (2B22023-BSD1)										
Hardness	61.4	1.00mg eq. CaCO3/L		66.2		92.7	70-130	0.325	20	
Duplicate (2B22023-DUP1)					Source: B2B0484-01					
Hardness	26.5	1.00mg eq. CaCO3/L			26.5			0.00	20	
Matrix Spike (2B22023-MS1)					Source: B2B0484-01					
Hardness	90.6	1.00mg eq. CaCO3/L		66.2	26.5	96.8	75-125			
Batch 2B22026: Prepared 02/22/02 Using General Preparation										
Duplicate (2B22026-DUP1)					Source: B2B0484-01					
pH	7.01		pH Units		6.99			0.286	10	
Batch 2B23006: Prepared 02/23/02 Using General Preparation										
Blank (2B23006-BLK1)										
Orthophosphate-phosphorus	ND	0.00200	mg/l							
LCS (2B23006-BS1)										
Orthophosphate-phosphorus	0.148	0.00200	mg/l	0.150		98.7	90-110			
LCS Dup (2B23006-BSD1)										
Orthophosphate-phosphorus	0.152	0.00200	mg/l	0.150		101	90-110	2.67	20	
Matrix Spike (2B23006-MS1)					Source: B2B0484-01					
Orthophosphate-phosphorus	0.0509	0.00200	mg/l	0.0499	0.00457	92.8	80-120			

North Creek Analytical - Bothell

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Amar Gill, Project Manager

North Creek Analytical, Inc.
 Environmental Laboratory Network

Page 8 of 10

Taylor Associates Inc
 7104 Greenwood Ave N
 Seattle WA/USA, 98103

Project: SR405 Vortechs
 Project Number: Not Provided
 Project Manager: James Packman

Reported:
 03/04/02 11:33

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control
North Creek Analytical - Bothell

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2B23006: Prepared 02/23/02 Using General Preparation										
Matrix Spike Dup (2B23006-MSD1)					Source: B2B0484-01					
Orthophosphate-phosphorus	0.0523	0.00200	mg/l	0.0499	0.00457	95.7	80-120	2.71	25	
Batch 2B25027: Prepared 02/25/02 Using General Preparation										
Blank (2B25027-BLK1)										
Phosphorus	ND	0.00500	mg/l							
LCS (2B25027-BS1)										
Phosphorus	0.149	0.00500	mg/l	0.150		99.3	90-120			
LCS Dup (2B25027-BSD1)										
Phosphorus	0.146	0.00500	mg/l	0.150		97.3	90-120	2.03	20	
Matrix Spike (2B25027-MS1)					Source: B2B0413-03					
Phosphorus	0.0378	0.00500	mg/l	0.0250	0.0150	91.2	57-137			
Matrix Spike Dup (2B25027-MSD1)					Source: B2B0413-03					
Phosphorus	0.0389	0.00500	mg/l	0.0250	0.0150	95.6	57-137	2.87	25	

North Creek Analytical - Bothell

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Amar Gill, Project Manager

North Creek Analytical, Inc.
 Environmental Laboratory Network

Page 9 of 10

Taylor Associates Inc
7104 Greenwood Ave N
Seattle WA/USA, 98103

Project: SR405 Vortechs
Project Number: Not Provided
Project Manager: James Packman

Reported:
03/04/02 11:33

Notes and Definitions

Q-07 The RPD value for this QC sample is above the established control limit. Review of associated QC indicates the high RPD does not represent an out-of-control condition for the batch.

DET Analyte DETECTED

ND Analyte NOT DETECTED at or above the reporting limit

NR Not Reported

dry Sample results reported on a dry weight basis

RPD Relative Percent Difference

North Creek Analytical - Bothell

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



Amar Gill, Project Manager

B2B02184

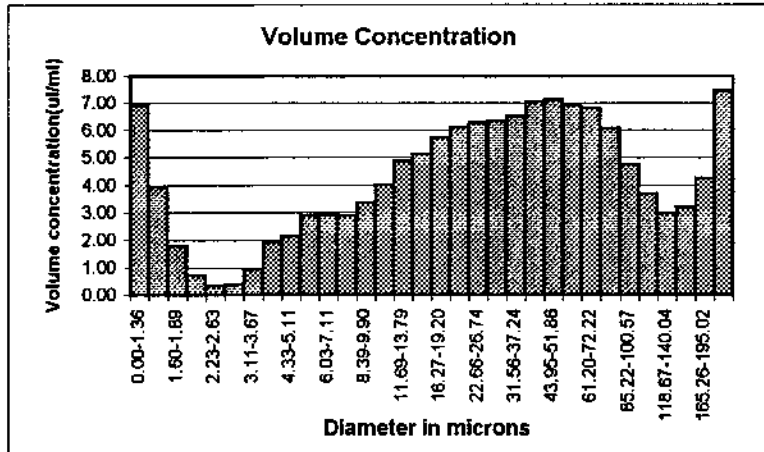
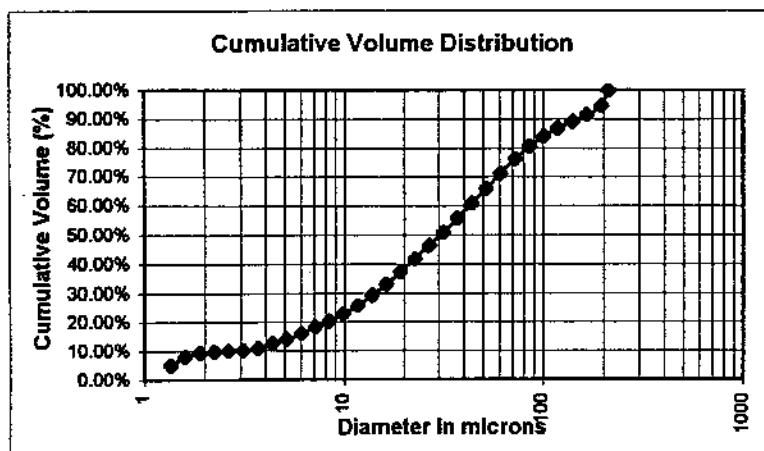
Appendix B- field sheets, xls, CoC - SR405

Particle Size Distribution Analysis Results

Report Prepared for:
Ingrid Weltz
Taylor Associates
Tel: 206.633.4486

Analysis Performed by:
Lynel Rabago
University of Washington
Department of Civil Engineering
Contact: Dr. David Stensel
Tel: 206.543.9358

Project ID: SR405 Vortechs
Sample ID: VOR-022102-IN-PSD
Date and Time Collected: 2/21/02 22:14
Date and Time of PSD Analysis: 2/22/02 12:30



Size Range (microns)	Volume Concentration (ul/l)	Cumulative Volume (%)	Mass (mg)
0.00-1.36	6.91	5.08%	4.55
1.36-1.60	3.95	7.97%	2.60
1.60-1.89	1.79	9.29%	1.18
1.89-2.23	0.70	9.80%	0.46
2.23-2.63	0.33	10.04%	0.22
2.63-3.11	0.37	10.32%	0.24
3.11-3.67	0.95	11.01%	0.63
3.67-4.33	1.92	12.42%	1.26
4.33-5.11	2.14	13.99%	1.41
5.11-6.03	2.87	16.10%	1.89
6.03-7.11	2.90	18.23%	1.91
7.11-8.39	2.87	20.34%	1.89
8.39-9.90	3.36	22.80%	2.21
9.90-11.69	4.00	25.74%	2.64
11.69-13.79	4.86	29.30%	3.20
13.79-16.27	5.12	33.06%	3.37
16.27-19.20	5.71	37.25%	3.76
19.20-22.66	6.09	41.72%	4.01
22.66-26.74	6.28	46.32%	4.13
26.74-31.56	6.35	50.98%	4.18
31.56-37.24	6.51	55.76%	4.29
37.24-43.95	7.05	60.94%	4.64
43.95-51.86	7.13	66.17%	4.69
51.86-61.20	6.91	71.24%	4.55
61.20-72.22	6.81	76.24%	4.49
72.22-85.22	6.06	80.69%	3.99
85.22-100.57	4.75	84.18%	3.13
100.57-118.67	3.69	86.89%	2.43
118.67-140.04	2.97	89.07%	1.96
140.04-165.26	3.20	91.42%	2.11
165.26-195.02	4.25	94.53%	2.80
195.02-212	7.45	100.00%	4.90
Total	136.23		89.70

Computed Statistics:

Weight Mean = 56.59 microns
D₁₀ = 2.23 microns
D₅₀ = 26.74 microns
D₉₀ = 140.04 microns

Volume of Sample: 1000 ml
Volume of Dilution: 1000 ml added
Comments: 1/0/00

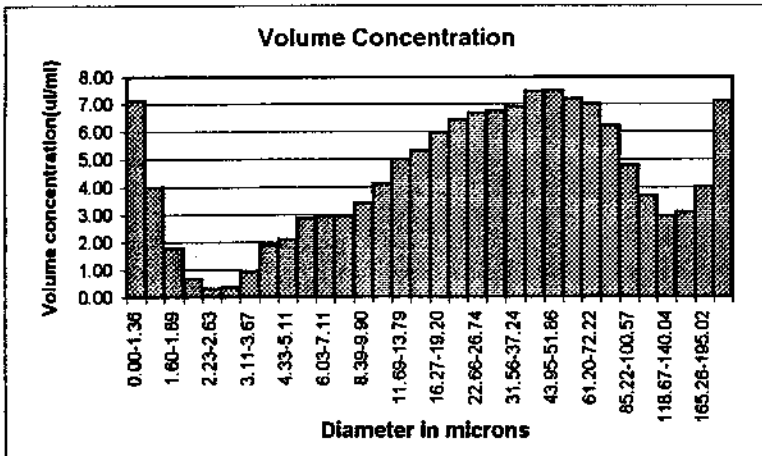
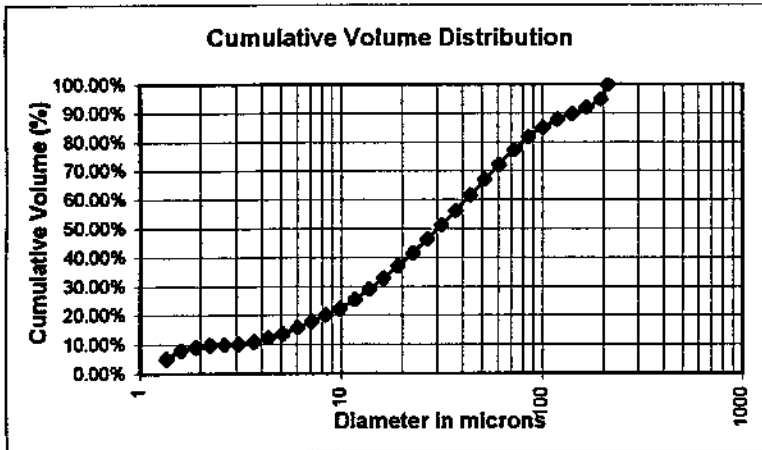
Size Range (microns)	Mass of TSS (mg)	% Mass TSS
< 212	89.70	92.57%
212-425	5.00	5.16%
425-850	1.80	1.86%
>850	0.40	0.41%
Total	96.90	100.00%

Particle Size Distribution Analysis Results

Report Prepared for:
Ingrid Weltz
Taylor Associates
Tel: 206.633.4486

Analysis Performed by:
Lynel Rabago
University of Washington
Department of Civil Engineering
Contact: Dr. David Stensel
Tel: 206.543.9358

Project ID: SR405 Vortechs
Sample ID: VOR-022102-OUT-PSD
Date and Time Collected: 2/21/02 22:20
Date and Time of PSD Analysis: 2/22/02 15:45



Size Range (microns)	Volume Concentration (ul / l)	Cumulative Volume (%)	Mass (mg)
0.00-1.36	7.15	5.12%	4.02
1.36-1.60	3.99	7.99%	2.24
1.60-1.89	1.76	9.25%	0.99
1.89-2.23	0.67	9.73%	0.37
2.23-2.63	0.31	9.95%	0.18
2.63-3.11	0.35	10.21%	0.20
3.11-3.67	0.93	10.87%	0.52
3.67-4.33	1.89	12.23%	1.06
4.33-5.11	2.09	13.73%	1.18
5.11-6.03	2.86	15.77%	1.61
6.03-7.11	2.93	17.87%	1.65
7.11-8.39	2.93	19.98%	1.65
8.39-9.90	3.41	22.42%	1.91
9.90-11.69	4.10	25.36%	2.30
11.69-13.79	5.01	28.95%	2.82
13.79-16.27	5.30	32.75%	2.98
16.27-19.20	5.95	37.01%	3.34
19.20-22.66	6.43	41.62%	3.61
22.66-26.74	6.68	46.42%	3.76
26.74-31.56	6.74	51.25%	3.79
31.56-37.24	6.90	56.19%	3.88
37.24-43.95	7.49	61.56%	4.21
43.95-51.86	7.51	66.95%	4.22
51.86-61.20	7.21	72.12%	4.05
61.20-72.22	7.02	77.15%	3.95
72.22-85.22	6.20	81.59%	3.48
85.22-100.57	4.79	85.03%	2.69
100.57-118.67	3.69	87.68%	2.08
118.67-140.04	2.95	89.79%	1.66
140.04-165.26	3.09	92.01%	1.74
165.26-195.02	4.02	94.89%	2.28
195.02-212	7.12	100.00%	4.00
Total	139.45		78.40

Computed Statistics:

Weight Mean = 55.32 microns
D₁₀ = 2.63 microns
D₅₀ = 26.74 microns
D₉₀ = 140.04 microns

Volume of Sample: 1000 ml
Volume of Dilution: 800 ml added
Comments: 1/0/00

Size Range (microns)	Mass of TSS (mg)	% Mass TSS
< 212	78.40	98.74%
212-425	0.80	1.01%
425-850	0.10	0.13%
>850	0.10	0.13%
Total	79.40	100.00%

SITE VISIT SHEET (SR 405 Vortechs™ Monitoring)

Date/Time 2/20/02 12:30 Field Staff TP Weather  ~18°C

Pre-Storm Visit - or - Post-Storm Visit (circle one)

INLET

Check Current Readings / Download:

ISCO Time? reset (Y/N)? 12:46 ✓
Time downloaded -
level (ft.) 0.023

OUTLET

Check Current Readings / Download:

ISCO Time? reset (Y/N)? 12:48 ✓
Level (ft.) 0.163
Velocity (f/s) 0.14 *
Flow (cfs) 0
Total Flow (cf) 8922.3
Sig/Spec str. 1/0
Time downloaded -

Pre - Storm Visit

INLET

Battery (V) 12.35
Clean bottle (Y/N)? Y
Pump tubing ok (Y/N)? Replaced? Y
Sampler tubing ok (Y/N)? Y
Strainer ok? -
Ext. desiccant ok (Y/N)? Changed? Y
Int. desiccant ok (Y/N)? Changed? Y
Measure Dn level? Ok? -
Sample Volume (ml) 200ml
Inspect Rain Gage Y
Sampler enabled? (Y/N) Y

OUTLET

Battery (V) 12.35
Clean bottle (Y/N)? Y
Pump tubing ok (Y/N)? Replaced? Y/✓
Sampler tubing ok (Y/N)? Y
Strainer ok? -
Ext. desiccant ok (Y/N)? Changed? Y
Int. desiccant ok (Y/N)? Changed? Y
Measure Dn level? Ok? -
Enable level (ft) 20.55
Pacing (cf) / Sample Volume (ml) 700/200ml
Sampler enabled? (Y/N) Y

Post - Storm Visit

INLET

Equipment Ran Completely? -
Sampler Enabled (date/time)? -
Composite Began (date/time)? -
Number of subsamples taken? -
Any subsample collection errors? -
Last Sample (date/time)? -
Est. Sample Volume Collected (ml) -
Sample ID? -

OUTLET

Equipment Ran Completely? -
Sampler Enabled (date/time)? -
Composite Began (date/time)? -
Number of subsamples taken? -
Any subsample collection errors? -
Last Sample (date/time)? -
Est. Sample Volume Collected (ml) -
Sample ID? -

Y/N	Value	Storm Validation Criteria
	hrs. (if known)	Was there an antecedent dry period of at least six hours?
	in.	Was total rainfall greater than or equal to 0.25"?
	hrs.	Was runoff duration greater than one hour?

Y/N	Value	Flow-weighted Composite Sample Validation Criteria
	% (approx.)	Was greater than 75% of the total volume of the storm sampled?
	# subsample	Were at least 10 sub-samples collected at the inlet?
	# subsample	Were at least 10 sub-samples collected at the outlet?

Was a field duplicate collected? If so, Sample ID. _____ Field blank collected? If so, Sample ID. _____

NOTES (including any problems with equipment or maintenance activities performed):

SITE VISIT SHEET (SR 405 Vortechs™ Monitoring)

Date/Time 2/22/02 7:00 Field Staff JP Weather light rain

Pre-Storm Visit - or - Post-Storm Visit (circle one)

INLET

Check Current Readings / Download:

ISCO Time? reset (Y/N)? OK
 Time downloaded 02:10
 level (ft.) 0.108

OUTLET

Check Current Readings / Download:

ISCO Time? reset (Y/N)? OK
 Level (ft.) 0.358
 Velocity (f/s) 0.40
 Flow (cfs) 0.185
 Total Flow (cf) 0.213
 Sig/Spec str. 1/23
 Time downloaded 02:15

Pre - Storm Visit

INLET

Battery (V) _____
 Clean bottle (Y/N)? _____
 Pump tubing ok (Y/N)? Replaced? _____
 Sampler tubing ok (Y/N)? _____
 Strainer ok? _____
 Ext. desiccant ok (Y/N)? Changed? _____
 Int. desiccant ok (Y/N)? Changed? _____
 Measure Dn level? Ok? _____
 Sample Volume (ml) _____
 Inspect Rain Gage _____
 Sampler enabled? (Y/N) _____

OUTLET

Battery (V) _____
 Clean bottle (Y/N)? _____
 Pump tubing ok (Y/N)? Replaced? _____
 Sampler tubing ok (Y/N)? _____
 Strainer ok? _____
 Ext. desiccant ok (Y/N)? Changed? _____
 Int. desiccant ok (Y/N)? Changed? _____
 Measure Dn level? Ok? _____
 Enable level (ft) _____
 Pacing (cf) / Sample Volume (ml) _____
 Sampler enabled? (Y/N) _____

Post - Storm Visit

INLET

Equipment Ran Completely? Y
 Sampler Enabled (date/time)? 2/21 02:23
 Composite Began (date/time)? 2/21 02:23
 Number of subsamples taken? 50/50
 Any subsample collection errors? no
 Last Sample (date/time)? 2/21 22:19
 Est. Sample Volume Collected (ml) 10.5L
 Sample ID? VOR-022102-JW

OUTLET

Equipment Ran Completely? Y
 Sampler Enabled (date/time)? 2/21 02:25
 Composite Began (date/time)? 2/21 02:25
 Number of subsamples taken? 50/50
 Any subsample collection errors? no
 Last Sample (date/time)? 2/21 22:20
 Est. Sample Volume Collected (ml) 9L
 Sample ID? VOR-022102-OL

Y/N	Value	Storm Validation Criteria
<u>Y</u>	hrs. (if known)	Was there an antecedent dry period of at least six hours?
<u>Y</u>	<u>1.56</u> in.	Was total rainfall greater than or equal to 0.25"?
<u>Y</u>	<u>~30</u> hrs.	Was runoff duration greater than one hour?

Y/N	Value	Flow-weighted Composite Sample Validation Criteria
<u>N</u>	<u>~20</u> % (approx.)	Was greater than 75% of the total volume of the storm sampled?
<u>Y</u>	<u>50/50</u> # subsample	Were at least 10 sub-samples collected at the inlet?
<u>Y</u>	<u>50/50</u> # subsample	Were at least 10 sub-samples collected at the outlet?

Flow
 40476 / 60008 = 0.6746
 Rain
 1.04156 = 70

Was a field duplicate collected? If so, Sample ID. _____ Field blank collected? If so, Sample ID. _____

NOTES (including any problems with equipment or maintenance activities performed):

APPENDIX B - Maintenance Inspection Field Log



Vortechs™ Stormwater Treatment System

Inspection & Maintenance Log

Model: **11000**
Location: **SR 405**

		Grit Chamber		Upstream Chamber		Flow Control		Downstream Chamber			
Date	Personnel	Sediment depth (in.)	Sheen and floatables	Sediment depth (in.)	Sheen and floatables	Sediment depth (in.)	Sheen and floatables	Sediment depth (in.)	Sheen and floatables	Maintenance	Comments
3/23/2000	IW	44.0	see comments	24.0	see comments	--	manhole sealed	--	--	Notified WSDOT that maintenance is required.	Water not visible in grit chamber. U/s chamber filled.
4/18/2000	WSDOT	--	--	--	--	--	--	--	--	Maintenance performed.	U/s and grit chambers cleaned.
4/20/2000	IW		--		--	--	manhole sealed	--	--		Visually inspected grit chamber and u/s manhole. Sediment had been removed.
4/28/2000	IW	0.0	many float.		none	--	manhole sealed	--	--		80% of grit chamber surface covered with cigs/straw.
5/2/2000	IW	1.0	--		--	--	manhole sealed	--	--		
5/16/2000	IW	1.0	few float.		few float.	--	manhole sealed	--	--		Sediment accumulating in u/s manhole.
5/23/2000	IW	1.0	--	4.0	--	--	manhole sealed	--	--		A large pile of sediment under the inlet pipe and large gravel in pipe.
6/2/2000	IW	1.0	--	4.0	--	--	manhole sealed	--	<1	few float.	Sediment piled almost to inlet pipe invert.
6/22/2000	IW	2.0	few float.		few float.	--	manhole sealed	--	--	--	Sediment piled to inlet pipe invert.
7/7/2000	IW	2.0	few float.	2.0	cig/trash/sed**	--	manhole sealed	--	<1	few float.	Sediment piled to inlet pipe invert.
7/20/2000	IW	1.0	slight sheen	2.0	slight sheen	--	manhole sealed	--	2.0	slight sheen	Sediment piled to inlet pipe invert.
8/9/2000	IW	2.0	<5 % straw	2.0	slight sheen, <5% float	--	manhole sealed	--	5.0	none	Sediment piled to inlet pipe invert.
9/12/2000	IW	2.0	sheen, 10% cigs, grass	2.0	water is clear, not float	--	manhole sealed	--	1.0	slight sheen	Sediment piled to inlet pipe invert. Some sediment in inlet pipe.
10/6/2000	IW	2.0	no sheen	2.0	water is clear, not float	--	manhole sealed	--	1.0	none	Sediment in inlet pipe
11/27/2000	IW	2.0	slight sheen, slight coverage of grass, pine needles, cig butts	3.0	water is clear, not float	--	manhole sealed	--	1.0	none	Sediment in inlet pipe, 16" across inlet pipe of about 1 diameter.
12/19/2000	IW	6.0	slight sheen, approx. 80% (3/4 pine needles, 1/4 cig butts)	10.0	no sheen, water clear, no float.	--	manhole sealed	--	2.0	no sheen or float. Water cloudy	Sediment in inlet pipe, 20" across inlet pipe of about 1 diameter. About 1' below outlet invert.
1/29/2001	IW	3.0	slight sheen, some pine needles and cig butts floating	12.0	no sheen, water cloudy	--	manhole sealed	--	2.0	no sheen, water slightly cloudy	Light rain at time of inspection. Some visible movement in grit chamber. Sediment in inlet pipe, 20" across inlet pipe. About 1' below outlet invert.
2/28/2001	IW	9.0	slight sheen	13.0	water clear	--	manhole sealed	--	5.2		Sediment in inlet pipe, 20" across inlet pipe. Approximately 2' diameter of pile above water level.
3/21/2001	IW/DS	6.5	sheen across surface, 10% float. Grass and cig.	12.5	water clear, slight trickle of flow	--	manhole sealed	--	2.7	water disturbed by maint. activities	U/s & D/s sample intakes cleaned. U/s chamber almost full w large sand and rocks. About 1' below outlet invert.
4/16/2001	IW/DS	7.5	Sheen. 60% float. (cig and pine needles)	16.5	no sheen, 5% float. (pine needles)	--	manhole sealed	--	2.7	slight sheen	Repositioned u/s intake line (1-2' above inlet) and removed strainer. U/s chamber almost full. Only about 2" from invert of outlet pipe.
5/3/2001	IW/JP	8.5	Slight sheen. 80% float. (mostly needles & cigs, some styrofoam).	18	no sheen, water clear	--	manhole sealed	--	2.8	water cloudy	Removed d/s strainer (still about 1-2 off pipe invert. Chamber almost full. Only about 2" from outlet pipe invert.

Grit Chamber				Upstream Chamber		Flow Control		Downstream Chamber			
Date	Personnel	Sediment depth (in.)	Sheen and floatables	Sediment depth (in.)	Sheen and floatables	Sediment depth (in.)	Sheen and floatables	Sediment depth (in.)	Sheen and floatables	Maintenance	Comments
6/29/2001	IW/JP	7.5	Slight sheen. 50% float.: cig and sticks, some styrofoam	20.5	no sheen, water clear	-- manhole sealed	-- manhole sealed	5.3	slight sheen, water cloudy	Fine sediment likely covering d/s sensor may need to clean if not flushed during storm.	A sediment bridge exists between inlet and outlet. Chamber is full.
10/11/2001	JP	20.4	Sheen 50%, float.: cigarettes, twigs, paper	20.8	no sheen, water clear	-- manhole sealed	-- manhole sealed	6.5	no sheen, water turbid		Was raining during visit. Flow seemed to be going unidirectional in grit chamber and not swirling.
12/20/2001	JP	24.5	Slight sheen. Twigs, leaves, bubbles present	19.7	no sheen, no float.	-- manhole sealed	-- manhole sealed	7.0	no sheen, no float.		D/s chamber very turbid.
2/8/2002	JP	24.4	Slight sheen. Twigs, leaves, bubbles present	22.2	sheen present, but no float.	not measured, manhole sealed	not measured, manhole sealed	7.2	no sheen, no float.		